GAS

ENGINEERING • UTILIZATION • LOAD-BUILDING • MANAGEMENT

SEP 9 1942

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"Now we're helping put the *Heat* on the Axis!"

Only yesterday, it seems, Payne was equipping thousands of American homes with gas furnaces—the finest that engineering leadership, modern facilities and precision methods could produce. Then—*war.* ★ Payne was granted early opportunities to serve. Back in 1940, we began deliveries to U. S. military bases; and soon, 47 camps and cantonments, Coast to Coast, were Payne-heated. Next—rapid conversion of our plant. ★ Today, our engineers pore over strange blueprints. Our shops hum day and night with a new activity. Our skilled workers are backing their brothers at the front (already the Payne employes' service flag is studded with stars)—and helping to equip Democracy's legions throughout the world—by all-out war production. ★ Meanwhile, our Research Laboratory is perfecting even better Payne furnaces for the gas industry's unlimited future. But their manufacture must wait. You know, and we know, there's only one job now that *really* matters.

YESTERDAY—
Paynehеat for the homes of America.

TODAY—
Precision parts for the arms of Democracy.

TOMORROW—
Still finer furnaces for the gas industry's post-war expansion.

PAYNEHEAT

Payne FURNACE & SUPPLY CO., INC. • BEVERLY HILLS, CALIFORNIA

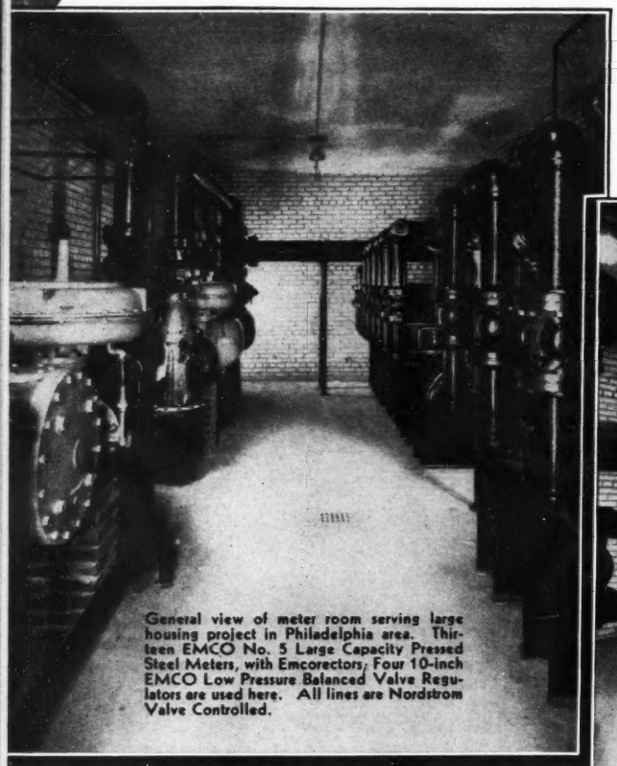
Economical—Dependable

SPACE CONSERVING EQUIPMENT

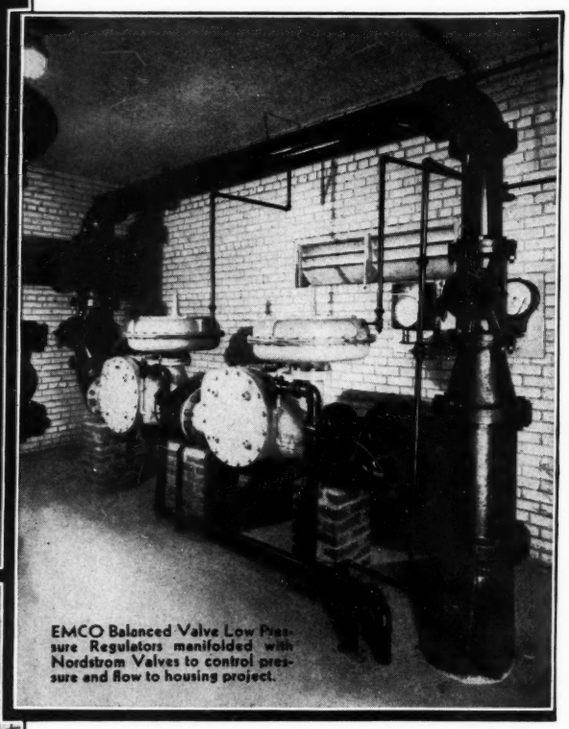
FOR MEASUREMENT AND CONTROL

in

- HOUSING PROJECTS
- ARMY CAMPS
- WARTIME INDUSTRY



General view of meter room serving large housing project in Philadelphia area. Thirteen EMCO No. 5 Large Capacity Pressed Steel Meters, with Emcorectors; Four 10-inch EMCO Low Pressure Balanced Valve Regulators are used here. All lines are Nordstrom Valve Controlled.



EMCO Balanced Valve Low Pressure Regulators manifolded with Nordstrom Valves to control pressure and flow to housing project.

Battery of EMCO No. 5 Large Capacity Pressed Steel Meters, equipped with Emcorectors, on Nordstrom Valve controlled lines in large housing project. The compactness of the EMCO and Nordstrom design makes this space-conserving meter installation possible.

TO THE already tremendous task of supplying gas for domestic and normal industrial consumption, the Gas Industry has undertaken to serve, in addition, new housing projects, army camps and our gigantic wartime industrial factories with this essential fuel.

In order to meet these unprecedented demands, the Gas Industry chooses wisely only equipment which will give efficient, uninterrupted service. Now, just as in peacetime, EMCO Meters and Regulators and Nordstrom Valves are being relied upon for accurate, dependable measurement and control.

From the accompanying illustrations it can readily be seen how valuable space is conserved when EMCO Meters and Regulators and Nordstrom Valves are installed. This graphic example shows one of hundreds of installations wherein EMCO and Nordstrom equipment is giving economical, dependable, accurate measurement and control.

PITTSBURGH EQUITABLE METER COMPANY

NEW YORK · BROOKLYN · DES MOINES · MEMPHIS · OAKLAND · TULSA · CHICAGO · BOSTON

MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.

NATIONAL METER DIVISION, Brooklyn, N. Y.

KANSAS CITY · PHILADELPHIA · SAN FRANCISCO · LOS ANGELES · SEATTLE · HOUSTON · COLUMBIA · BUFFALO

EMCO NORDSTROM

Look to *Titan* For Better Controls—

If we could have talked face to face with you at the Convention this year — this would have been our message.

Right now, TITAN is busily engaged in doing what you want us to do — helping to win the war. TITAN men and machines now are turning out precision parts in quantity for war equipment.

But we are thinking about and planning for after the war — designing new controls that will be better than anything you have known in the past.

Don't ask us when you can get them. Your guess is as good as ours — but take our word for it, that when hostilities cease, TITAN will be ready to serve you.

THE TITAN VALVE AND MANUFACTURING COMPANY
9913 ELK AVENUE . . . . . CLEVELAND, OHIO

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REG. U. S. PATENT OFFICE

Eighteenth Year of Publication

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GUEST EDITORIAL

P.C.G.A. Celebrates Fiftieth Anniversary

By R. S. FULLER

President, Pacific Coast Gas Association
Engineer, Gas Construction and Operations, Pacific Gas and Electric Co., San Francisco.

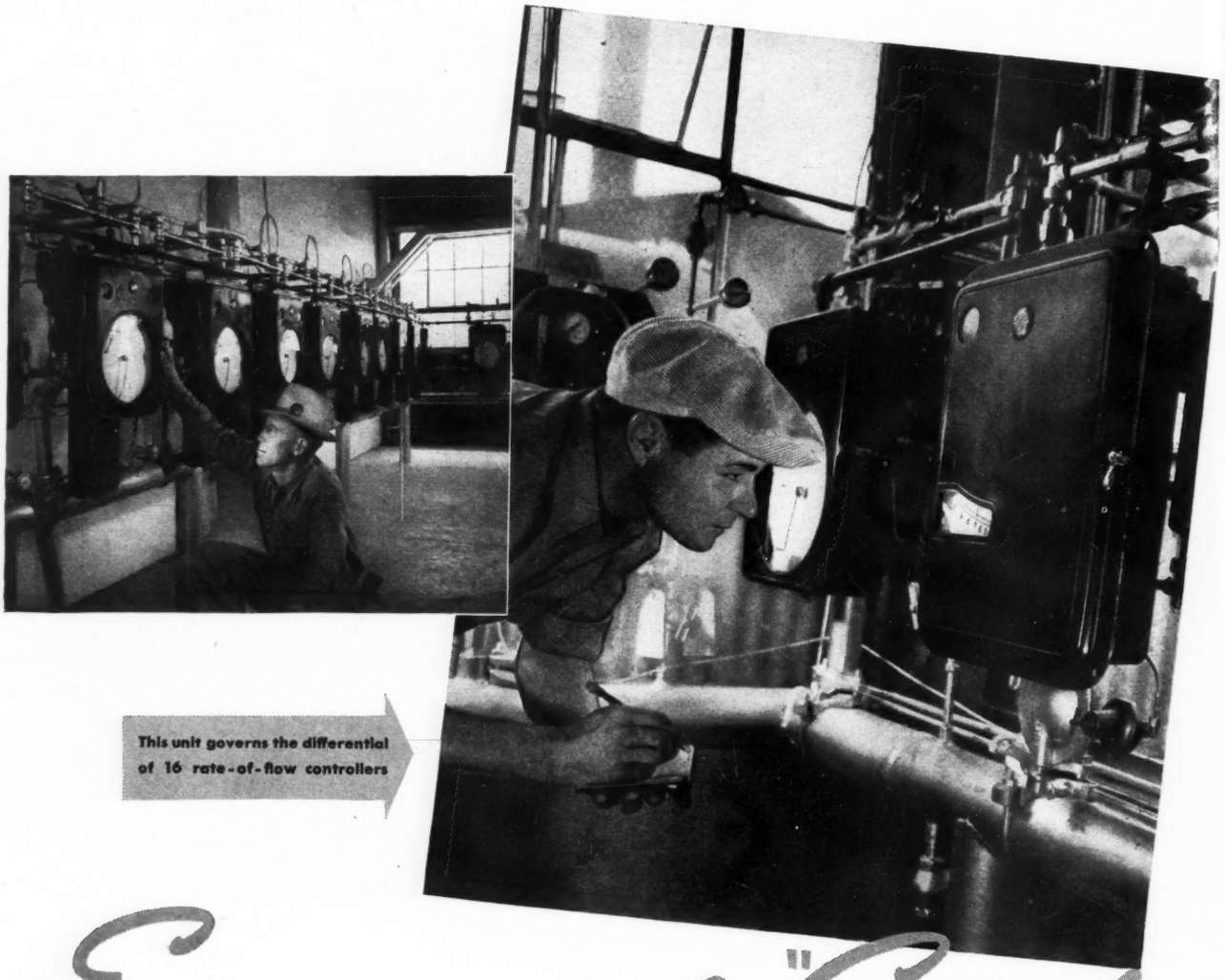
DURING times such as the present, when all our efforts are directed to the very definite object of winning the war, we are prone to overlook, even to forget, some of those things which have had no small part in fitting us for that job.

On October first of this year the Pacific Coast Gas Association will enter upon its 50th year of continuous service to the gas industry. In times more nearly normal this would no doubt be made the occasion of fitting celebration, for it is the golden anniversary of a golden period in this land of golden sunshine.

Fifty years is not long as history goes, but it is the working life-span of a man—it is half a century and it is a long time for any industry to have maintained as fruitful a cooperative effort as has the Pacific Coast Gas Association. Of the group of gas men who met in San Francisco on July 11, 1893, only three are still with us—Charles F. Adams, now a banker in Portland; John Kempf, living in retirement in Piedmont; and C. O. G. Miller, now Chairman of the Board of Pacific Lighting Corporation.

In the intervening years many brilliant figures have come and gone, each doing his part in the upbuilding of an industry which has not yet reached its peak. In 1893, this western country was young and undeveloped; the gas industry knew of no service but lighting, and the electric industry was an untried fledgling. The Pacific Coast Gas Association was organized with 54 members, they were energetic men and took great pride in their industry. They and those who joined them took the Spanish War in stride, remarking that it should open new markets in the Orient and bring more customers to the Coast for them to serve. They continued to work, to study, to invent and grow, and the results of their efforts, as discussed at Association meetings, brought them worldwide fame in the industry so that in 1915 they were hosts to the International Gas Congress. They went through the first World War, bending all their energy to its winning. Then as now, there were factories, shipyards and training camps crying for fuel, and while gas was relatively unknown in the heavy industrial field, their pioneering opened this field which is so important to us and our country today.

We are now engaged in another titantic struggle, and the need for resources and services is infinitely greater than that of 25 years ago. Let those of us who today hold the torch for the gas industry take courage and inspiration from those who have gone before so that it may be said of us, as we now say of them, "They carried on."



This unit governs the differential of 16 rate-of-flow controllers

Engineers at the "Controls"!

Unflagging efforts of the petroleum industry's engineers, during the past few years, have been toward greater efficiency of operations and lower operating costs.

The checks and controls set up have called for the greatly increased use of metering. And this, in turn, has promoted conservation of petroleum products, simplification of operations, and lower investments due to streamlining operation—decreasing the use of tankage and other equipment.

Note how well these achievements dovetail with today's national needs and urgencies.

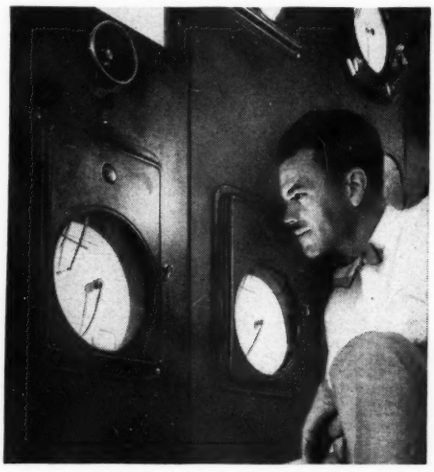
American Meter Company's experience as measurement engineers, applied in the petroleum industry since its beginning, has enabled the company to make modern contributions of very practical value.

One is the Air-Actuated Remote Recorder and Controller . . . a rugged yet sensitive device for the recording and control of pressures, rates of flow, and liquid levels—over any distance. It has helped many an operator perfect the desired well-coordinated system of centralized control. This Metric-American instrument is described in Bulletin E-22, obtainable upon request.

1871

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)
METRIC METAL WORKS • ERIE, PA.

Recording liquid level by long-distance transmission



THERMALLY THINKING

Things to Come

THE recent action of the New York State Commission in approving the use of postal cards for public utility bills is a sensible permission and wholly in accord with the necessity of conserving materials, as well as cutting down the labor necessary to handle the monthly billings. We believe that this procedure should be followed by all gas companies as rapidly as the decrease in available clerical help and the shortage of envelopes and paper make it appear expedient. In states where the regulatory bodies have rulings against this method of billing, they should be petitioned immediately for action to permit of the simplified and economical practice.

In light of the current predictions of an ever-increasing shortage of man power due to the demand of the growing army, it is also prudent at this time to consider the possible necessity of employing women as replacement readers for men called into the military or other service where they will be more urgently needed.

Meter reading by the customer is also a system that has possibilities; although it is practically unknown in the natural gas industry, it has been developed to a high degree of efficiency by many liquefied petroleum gas companies who have thousands of domestic accounts to be checked every month. A double postal card is sent monthly to each consumer, one side explaining the method of reading the meter, or in the instance of a gas utility it might be devoted to an explanation of the necessity for this cooperation in the interest of national defense. The return half of the card carries a facsimile of the meter index, with instructions to the user to mark in the blocks, or on the dials, the position of the hands at the time of reading. This with the date of the reading is all that is necessary to make the proper billing.

The inconveniences and the makeshifts that all industry has had to contend with are as nothing compared to those which are in store. It is only by prudent foresight that their worst effects can be somewhat mitigated. The presence of women in unaccustomed places in industry, and the curtailment of the little refinements of service that in peace are considered essential, are all part of the wartime phenomenon. It is a solace to reflect that neither survives the shooting by long.

■ ■

Politics as Usual

WITH the limited amount of patience that we can muster up when the call of high patriotism is being flagrantly disregarded, we have been perusing a little handbill sent out by the REA to its subscribers, which is one of a flood of throw-aways that the Department of Agriculture has on hand for the edification of rural consumers of electricity on the REA lines.

Like most of the literature in this elevating series, the current eruption entitled "Give and Take," with a subcaption, "Nine Ways in Which You Can Help Your Co-op," is written with the Hey, Rube, or Look What We Done for You slant, geared down to the simple and grateful type of mind that the REA envisions as a composite of the intellectual average of its members.

But in a day when economy in all things, particularly personal economy in the use of facilities that cannot be expanded until the war is over, is the keynote, we believe that of the "nine ways," numbers seven, eight and nine are far from being in step with the requests that are being made of the consumers of the lines of the privately owned utilities.

Item seven advises "Use electricity abundantly. Increased use means profit for member and co-op alike. More power, lower cost." Substitute the name of any gas or electric company for the word co-op in that one, and see how the indignant press releases would fly out of Washington hinting at possible disciplinary action that might have to be taken if better cooperation in the war effort were not forthcoming.

The eighth way: "Encourage your neighbors to use more power. Electricity will help them as it has you. Tell them about it." There is one that should be watched by the FBI itself. How can one advise his neighbors to use more power without implying that any danger of a power shortage is a myth, a part of the pattern of psychological terrorism that is employed by the enemy to undermine the confidence of the citizens of a democratic country, and to paralyze their will to further resistance? We have no intention of sabotaging the war effort by going around advising our neighbors to use more power, or to do anything else except buy more war bonds.

Number nine goes right off the deep end with: "Build community power use. Help co-op and community by extending service to churches, schools and halls." Since construction has already been halted on new power and light projects except those directly designed to serve the war program, it looks as if helping co-op and community by extending service will have to be out for the duration.

These things do not, of course, justify any suspicion that the REA has not been apprised of the state of belligerency that exists between ourselves and the Axis powers. It does not indicate that the Department of Agriculture is not cooperating fully in the interest of ultimate victory.

But it does carry an implication that is far beyond the significance or the effectiveness of the poor pamphlets that are now being stuffed into the mail boxes of rural consumers. That implication is that tirelessly, objectively, day in and day out, the message of the benefits of public ownership of public utilities is being carried to the American people. The greatest cataclysm that this country has ever faced surges around and over the rock of this proselyting. The stern faces of the prophets of a New Deal order have not relaxed, and the blood and sweat and the tears that have coursed down the cheeks of others have not dimmed the light of unwavering fanaticism that burns in their eyes.

America can win its war. But before a united nation can be rallied to the individual selflessness without which no victory can be even dimly envisioned, the political opportunism and the social tinkering that have attached themselves to the party in power must be eradicated. If business as usual is out, as we have so often been sternly admonished, let all of the agencies of the government be the first to show by example their understanding of its fullest implications.

GAS at WAR

Employees in the Service

WITHOUT benefit of a fanfare of publicity, or the tender ministrations of a round table of experts, the humble house organ has been going quietly along doing one of the most important employee relation and soldier morale building jobs of the entire war effort. Now the house organ is about to be discovered.

A recent issue of a national advertising and selling magazine is featuring an article which discloses what house organ editors found out some time ago: that the employee in the service is the house organ's most avid reader and greatest fan. Clear evidence that house organ editors have understood this hunger of the employee in the service for news of the office and shop and met the need intelligently is to be found in the columns of practically every company magazine or newspaper.

Here, added to but not replacing the regular news which the service employee wants primarily, is to be found news, pictures and excerpts from letters of the men in the services. The Laclede News, Laclede Gas Co., St. Louis, Mo., uses two pages in each issue under the special heading, "Laclede's Military Memos." On these two pages are short news notes about the various men in service and excerpts from their letters. In every case, the individual is identified by name and by his former job. The contents of the letters range over such subjects as thanks for getting the paper to an extended report by one former member of the customer's service department on his experiences on the rifle range, which includes the information that if the rifle is not held correctly "you get a beatiful black eye."

The July-August issue of Niagara Hudson News, Niagara Hudson System, New York, was an all service man's number. Besides numerous pictures of men in the service, a list of all men on leave of absence from the company was given.

Carrying the same idea further, the San Diego Gas & Electric Co., San Diego, Calif., is now publishing a special magazine for its employees in the service. It is called "Shorts and Flashes" and is devoted exclusively to its men in service. With circulation limited to this group, the editorial style departs considerably from that usually followed in house organs, being robustly personal and entertaining.

That house organs fill a definite need in the life of a good soldier is also recognized by the Army and Navy authorities. As useful mail, the house organ ranks right along with the letters from home in receiving official transportation to the men in the field.

To the utility company, the soldier's and sailor's hunger for information about his former company and fellow workers offers a splendid opportunity to do a real job of building satisfactory employee relationships. Through the pages of the house organ, the company can both keep alive the employee's interest in the job to which he will return after the war, and keep him informed on the changes and advances the company is making in his absence.

Present at the recent raising of the Consolidated Edison Co., New York City, service flag were Lieut. H. J. Bachman, U. S. Navy, on leave from Consolidated's personnel department; Mrs. Alverna Garcia, whose son, Robert, accounts for one star in the flag, and Oscar H. Fogg, vice chairman of Consolidated's board of trustees.

■ ■

Conservation of Materials

One way to help in the present war effort is by concentrating on the conservation of office supplies and equipment. To that end, the Metropolitan Life Insurance Co., New York City, has prepared a report called "Wartime Conservation in the Office" which outlines the chief points at which savings may be made and discusses the three approaches of education, enlisting employee cooperation, and of restrictions in issuing supplies as solutions to this problem of eliminating waste.

With the need for salvaging metal to keep the river of scrap flowing into the furnaces and smelters of the country taking the spotlight in the past few weeks, private business has swung behind the WPB drive for scrap metal with an American Industries Salvage Committee organized to attack the scrap problem on two broad fronts. Backed by a large advertising campaign, the committee will work to reach every manufacturing and business concern and impress upon them the absolute necessity of getting their scrap on the way to the production line. It will also strive to persuade business to cooperate with the local salvage committees of the WPB which have already been set up in 12,000 communities.

■ ■

Wartime Customer Relations

AS the nation begins to settle down into the routine of the war effort, with its many changes in civilian peacetime habits and procedures, the question of how to maintain customer good will and consumer acceptance of gas has become a major gas company problem all over the country. With no appliances to market, and with restricted personnel, gas companies are meeting the problems of wartime conduct of their business with originality in many instances.

Here are four outstanding examples of alertness in modifying advertising and selling methods to meet the needs of the day:

United Gas Corp., Houston Division: To facilitate the paying of bills by customers who work odd hours and need to conserve transportation facilities, the company has inaugurated an arrangement whereby bills may be paid at any one of 47 different store points in the city. Included in these points are the stores of three large chain groups and a number of independent stores. In this way, Mrs. Houston Housewife can pay her bill while doing other shopping. In addition, many of these stores are open late hours and on Saturdays, Sundays and holidays. For swingshifters and others who are now working odd hours, this time schedule is of real assistance. The plan has been in operation one month, with over 15,000 bills totaling over $27,000 having been paid so far by this new method. The cost of collecting bills in this manner has been found to be about the same as formerly when the work was handled by the company offices exclusively.

Colorado Public Service Co., Denver, Colo.: To maintain the sales force that will be seriously needed after the

if you really need new equipment
With factories on full war-time production gas ranges and other appliances are becoming less and less available. Therefore take good care of your present equipment. If you need new equipment, the following information will assist you to determine if you are an eligible buyer in accordance with Government orders restricting the sale of gas appliances.
YOU CAN BUY A NEW GAS RANGE
IF... (1) Your present range is completely worn out and beyond repair.
(2) Your premises are not equipped with a range and you do not have cooking equipment.
(3) You are engaged in constructing a Defense Housing project.
(4) You are remodeling a large home and breaking it into several small apartments, you may purchase the ranges necessary to meet the cooking requirements.
YOU CAN BUY A NEW GAS WATER HEATER
IF... (1) Your present water heater is completely worn out and beyond repair.
(2) Your premises are not equipped with usable means of heating water.
(3) You are engaged in constructing a Defense Housing project.
(4) You are remodeling a large home and breaking it up into smaller apartments, you may purchase the gas water heaters required to supply adequate hot water.
YOU CAN BUY GAS HEATING EQUIPMENT
IF... (1) You have rooms in which you do not have some type of heating equipment. This includes Appliances such as Floor Furnaces, vented and unvented Circulators, Gaseam Radiators and Radiant Heaters.
(2) If your present central heating plant is in need of repair, dealers will make the necessary replacements to put it into condition for the heating season. If it is beyond repairs that would restore it to workable condition, it may be replaced from stock if available.
See your gas appliance dealer or your gas company NOW so that you will be prepared for winter. If you are eligible for new equipment you will be assisted in making out the necessary signed application for your requirements.
LONE STAR GAS SYSTEM
Lone Star Gas Company

Cutting through the maze of confusing language used in the government communiques on the subject of who can and who cannot buy such gas appliances as are available to the public, the Lone Star Gas Co., Dallas, Texas, used this straight speaking advertisement to effectively inform their customers about the appliance situation. Such informative advertising both builds confidence in the company and lightens the load of inquiries that must be answered by busy customer contact staffs.

war, this company has made a 100% conversion of its salesmen to service men. Thirty-eight men were affected by the changeover which involved the discontinuance of all sales activity. After being put through an eight-meeting training program last March, these men are methodically covering the city making minor adjustments and doing simple repairs on gas ranges, water heaters, space heaters and electric appliances. Major repairs are handled in the Public Service shops at a base rate of $1.25 an hour. The company reports it is "breaking even" on appliance work, the only cost to the program being the salaries of 38 sales-servicemen.

Laclede Gas Co., St. Louis, Mo.: Launching a double-pointed advertising campaign of two-color ads in local newspapers and on 50 billboards in the city, this company has swung behind the Home Volunteer Program suggested to the industry by Servel, Inc., last April with a major selling effort. Supplementing the advertising, approximately 15 former sales supervisors and key salesmen have been re-employed as Home Volunteer Consultants and put to work on a home-to-home canvass in the interests of the Home Volunteer idea. This house-to-house canvass also includes the making of a survey on the age and condition of all major appliances in gas customers' homes as well as an investigation of the housewife's attitude toward the Home Volunteer movement. Before beginning the work of home calls, all the consultants were given a thorough training in the various phases of nutrition and conservation so that they could give information and help to the homemakers meeting the problems of war in the home.

Peoples Gas Light and Coke Co., Chicago, Ill.: Stating, "The foundation of our national unity can be said to be supported by two universally accepted convictions. The first is that the United Nations will win the war. The second is the popular acceptance that continued sacrifices are necessary," this company has cooperated in the preparation of "Displays for Victory" in its show windows. Some of those already presented have shown a collection of the first flags of the country, and another was devoted to a presentation of the insignia of the various branches of the service.

■ ■

Disaster Communication

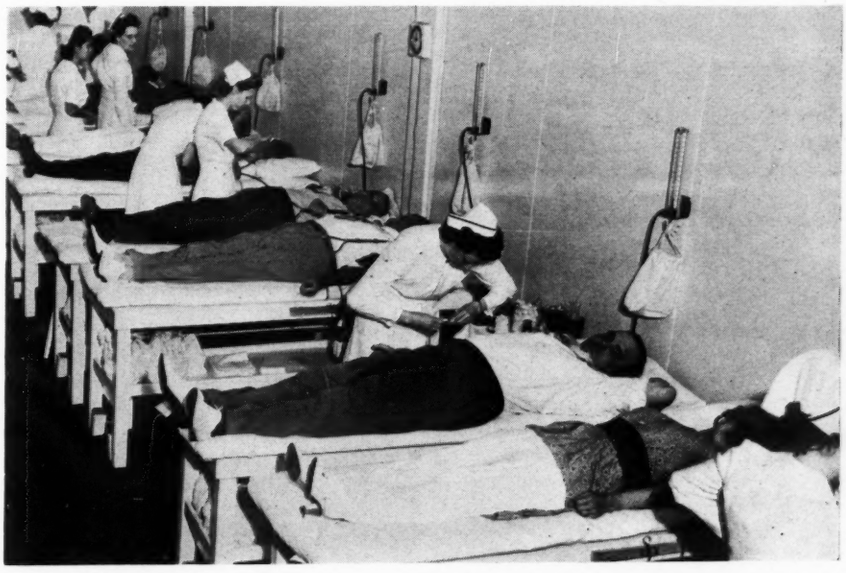
Designed to overcome the peacetime interruption of communication during such disasters as earthquakes or floods, the recently completed radio-telephone emergency communication system of the Southern California Gas Co., Los Angeles, Calif., is ready to assume the grimmer task of conquering a man-made cataclysm of bursting bombs and sweeping fires in case of Jap air raids. Altogether, the company has three 50-watt sending and receiving sets mounted on trailers and six 16-watt sets mounted on trucks. Supplemented by the three 50-watt emergency stations operated by the Southern California Edison Co., the gas company is prepared to get its essential messages through even if regular lines of telegraph and telephone communications fail, as would be likely in an air attack.

■ ■

Blood Donors

For the second time within a month, the employees of the Southern California Gas Co., Los Angeles, Calif., first company in the United States to take over a blood center for a day, are planning to reserve the Red Cross Blood Donor Center in Los Angeles September 3. August 3 the number of donors was limited to 350 by the restricted facilities of the center but since their enlargement it is expected the second day will establish a record of nearly 600. With the Center remaining open from 8:30 in the morning to 8:20 in the evening, that number of volunteers from the gas company employees and their families can be accommodated.

Employees of the Pacific Gas & Electric Co., San Francisco, Calif., have added to their war contributions by becoming blood donors. In the San Francisco district alone, 275 men and 125 women have been donors, with this number materially increased by groups and individuals from the North Bay and East Bay districts and other sections of Northern and Central California. The donations have been largely the result of a campaign conducted by the Pacific Employees Association, under the leadership of Charles Mason, president, and Harold Carr, secretary.



Los Angeles Red Cross Blood Donor Center which six hundred Southern California Gas Co. employees and their families will take over for a day.

WPB Discusses Butane

The following extracts are taken from a letter addressed to BUTANE-PROPANE *News* from Washington, D. C., under date of August 15, 1942:

"It is difficult for the War Production Board to make any definite statement because the conditions change over night.

"A good example of this is the demand for butane. A few months ago we felt that the demand for butane for the manufacture of high octane aviation gasoline and the needs for butane in our synthetic rubber program would produce a shortage of that product. At the moment it appears that, due to technological development in the manufacture of high grade aviation gasoline and due to revised and new methods of manufacturing synthetic rubber, this expected demand for butane will not develop.

"The thing that we are concerned about now is the transportation problem. If we can solve this problem . . . we do not anticipate any shortage of butane for either domestic or automotive uses.

"Perhaps we could sum this up into one paragraph by saying that the War Production Board is not going to be forced to restrict the use of butane as much as it had at one time felt would be necessary. If the War Production Board can continue to permit the use of butane in all present usages, that will be much better than we had expected to be able to do a few months ago. If we can be more liberal in expansion of uses than we have been, it will be solely because by so doing we are making best use of whatever fuels we have for the purpose of conducting this war to a successful conclusion.

"W. Walter Timmis, Chief
"Plumbing and Heating Branch
"By: John F. Steele, Chief,
"Liquefied Petroleum Gas Section."

Washington Notes

Domestic Space Heaters: The War Production Board on August 5 issued Limitation Order L-173, cutting off further production of domestic space heaters using fuel oil or gas except to fill orders for Government agencies.

Types of heaters covered by the order are those designed to heat only the space in which they are located and which are not equipped with distribution pipes. Included are circulating heaters, radiant heaters, direct fired gas unit heaters, and floor and wall furnaces.

The order permits the production of replacement parts so that units now in operation can be kept serviceable.

The Plumbing and Heating Branch estimates that manufacturers and dealers have stocks of 200,000 oil heaters and 300,000 gas heaters on hand.

Heating and Cooking Equipment: Amendments 1 and 2 to Limitation Order L-79, covering certain plumbing, heating and cooking equipment, were issued August 11 by WPB.

The first amendment includes in the terms of the order cooking and baking equipment using coal, oil or gas. Previously only those types of cooking or baking equipment connected to gas or steam systems were covered.

The second amendment includes the following gas-burning heating equipment in the terms of the order: steam and hot water heating boilers, warm air furnaces, floor furnaces, unit heaters, conversion burners, and gas steam radiators.

An additional exception, which permitted the sale of oil burners when such transactions were made for the purpose of reducing consumption of fuel oil, was revoked by Amendment 2.

Industrial baking ovens and other types of industrial baking machinery are not covered by the terms of the amended order, as they are regulated by Limitation Order L-83.

Issuance of Amendment No. 1 to Preference Rating Order P-84, providing for preference rating assistance in connection with repair and maintenance of cooking and baking equipment, was also announced by the WPB.

Utility Maintenance and Repair: Amendment No. 3 issued July 30 removes from P-46 authority to all utilities to complete construction projects 40% complete on Dec. 5, and provides no additions or extensions to electric systems except as authorized by WBP. Cost of material for an underground project must be less than $1500, and other projects the cost must be less than $500. No single project may be subdivided into parts to come below these limits.

Domestic Watthour Meters: Of passing interest to the gas industry is the issuance of Limitation Order L-151 which prohibits the production of such meters after September 26. Deliveries are also restricted to those authorized by the Army, Navy, Maritime Commission, War Shipping Administration, under application through P-46, and by specific authorization of the Director of Industry Operations.

Heat Exchangers: Heat exchangers, urgently needed in war industries and by Army, Navy, and Maritime Commission, were placed under a system of complete allocation August 5 by order of the Director General for Industry Operations.

The order (L-172) prohibits the placing or acceptance of orders for heat exchangers covered by the regulations unless specific authorization is granted by the Director General on Form PD-615A. Application for authorization to place orders must be made on Form PD-615.

Liquefied Petroleum Gases: Through Amendment 1 to Limitation Order L-86 effective Aug. 15, the WPB changed the method of applying for relief from the restrictions of Order L-86 by amending that part of Paragraph (d) (5) which previously required application to be made by letter and for information concerning the application to be submitted on Form PD-397, according to a bulletin of the Liquefied Petroleum Gas Association.

The WPB also amended Paragraph (f) by striking out the reference to Preference Rating Order P-98. This change now makes it possible for oil producing companies to order LP-Gas equipment under the terms provided by Preference Rating Order P-98. The use of this Order is restricted to oil producing companies.

Form PD-397 (revised) is a printed form and members of the industry who require copies should obtain them either directly from the WPB, Washington, D.C., or any Field Office.

Filing of Exception Applications: Correct procedure for members of the natural gas and natural gasoline industries who file applications for exceptions under Conservation Order M-68 was explained July 28, by Deputy Petroleum Coordinator Davies.

Copies of applications for exceptions are to be forwarded to the Director of Natural Gas and Natural Gasoline, Office of Petroleum Coordinator, New Interior Building, Washington.

Applications for exceptions in other production branches of the industry will continue to be forwarded to the Director of Production, Office of Petroleum Coordinator, New Interior Building, Washington, D. C.

In all cases, three copies of the applications should be sent directly to the division concerned in Washington. A fourth copy should be mailed or delivered to the OPC district director of natural gas and natural gasoline or the district director of production, as the case may be, for the district in which the lease, pool, or plant is located.

Form PD25A: In order to facilitate authorization of critical raw materials to companies operating under the PRP during the fourth quarter, a supplementary material information sheet, use of which is optional, has been added to revised Form PD-25A.

In issuing the sheet the Office of Op-

erations pointed out that in the past, authorization of critical materials to a PRP unit often has been delayed in order to make sure that such authorization would not contravene any conservation or limitation order.

The new sheet eliminates this delay by providing a standardized form in which the manufacturer may give additional information on certain critical materials.

■ ■

Plant Protection

Complete plans for defense against any enemy bombing attacks have been arranged by the gas service departments of the Colorado Public Service Co., Denver, Colo.

The entire pipe line distribution system, consisting of low pressure lines augmented by 13 pressure-regulator feeder stations, has been divided into zones comprising industrial and residential areas. Each zone will be controlled by its own pressure regulating station, which can turn off gas delivered into that area. Each station is equipped with plugging equipment for breaks, fire-fighting apparatus and repair items.

Holders, main station and other gas properties have been rewired for central manual switch control of electric lighting, which can be switched off in an instant. The main building is a part of the established air raid warden system, and has also been provided with remote control switches for extinguishing interior lighting and the 7000-bulb facade which is one of the brightest spots in the mountain city.

Almost two-thirds of the personnel are now trained for first aid service, and there are 15 Bureau of Mines First Aid Course graduates on the payroll. Refresher courses have been given all former Red Cross graduates.

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"Jet" Now Fights Fire Bomb

The superiority of fighting incendiary bombs with a "jet," instead of a "spray," was conclusively proved at a demonstration by the Army Chemical Warfare Service in New York, July 30, before Mayor LaGuardia and New York fire and civilian defense officials.

Fifteen seconds was the time required to extinguish a four-pound fire bomb with a jet; 1 minute and 5 seconds, by the old-fashioned spray. Besides taking more than four times as long by spray, that method required more than twice as much water.

The demonstration was provided to remove any uncertainty as to the efficacy of the new instructions for fighting fire bombs, recently announced by Office of Civilian Defense Director James M. Landis.

War Advertising

Reverting to the simple but effective technique of the A. B. C. blocks so popular in teaching the small fry their alphabet, the new series of conservation ads prepared by the A. G. A. national advertising committee cover the subject of conserving gas, food, and appliances from A to Z. A sample of the ads which feature a letter of the alphabet with an accompanying jingle is seen above. The 1-col. 3-in. ads are available only in the entire series of 26 at a cost of $1.50 from the Association, 420 Lexington Ave., New York City.

Nutrition

Judging from a recent copy of "Home Service," published by the British Commercial Gas Association, not even the greatest crisis in England's history has jarred the English householder out of her set ways of cooking and feeding her family. In "Notes to Demonstrators," an entire column is devoted to exhorting home service directors to help in the government's campaign of selling the British woman on the idea that wholewheat bread will not cause various digestive ailments, that it is, on the contrary, as dietary experts have always insisted, more nutritious than white bread. All else failing, the home service worker is urged to appeal for its use on the ground that it saves shipping. This latter should be a potent appeal, since without those ships the English homemaker will end up with no bread at all, either white or wholewheat.

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Except that the project would probably use up all the critical metals, it might be a good idea for the government to strike off medals for those civilians who contribute of time and energy beyond the requirements of their regular duties just as it does for those men in the service who perform acts of bravery beyond their regular line of duty. Women employees in the Pacific Gas & Electric Co., San Francisco, Calif., are an example. In addition to their many other activities, over

This attention-getting display in the Nacogdoches office of the United Gas Corp., Houston, Texas, as part of their activities in support of the canning program of that district. Sponsored by county and federal governments, the program is expected to result in several thousand cans of food for the school children of Nacogdoches County.

200 of them are serving evenings in the night canteen operated by the AWVS. These women dispense over 3000 sandwiches and hundreds of gallons of coffee and chocolate to men on defense duty around the Bay. Another group helps to operate the AWVS canteen in the Federal office building each Saturday morning, while another group carries on at the AWVS Officers Club.

On the basis that workers in war industries form the second line of defense, special emphasis has been given lately to the need for concentrating the nutritional education campaign on the wives who are feeding the war workers of the country. In a recent all-day meeting of company home service women representing the Gas Service Co., the Kansas City Gas Co., and the Wyandotte County Gas Co., in Kansas City, Mo., this problem was given particular attention and it was suggested that it did not matter much whether a homemaker knew the difference between vitamin A and calcium as long as both were included in proper proportions in her family's diet. For that reason, women must be taught without too much regard for scientific terminology.

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Fuel Conservation

"Cut your fuel costs and help speed victory" is the general theme of an advertising campaign which has been launched by the natural gas companies serving the greater Pittsburgh area. The drive is aimed directly at the conservation of gas fuel against wintertime shortages, and indirectly at the promotion of automatic gas heating in insulated homes. The campaign will strive to sell householders on the idea of insulating their homes against heat losses by the installation of insulated roofs and side-walls, storm windows and doors and weatherstripping. Such insulation will then make it possible to sell gas heating to these householders.

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Kitchen Mechanics

Now that women have exploded the old theory of mechanical incompetence by walking into airplane factories and shipyards and turning in a good day's work on the production lines, the Santa Barbara, Calif., American Women's Voluntary Services in cooperation with the Santa Barbara office of the Southern Counties Gas Co., Los Angeles, Calif., is carrying this new found aptitude to the limit of its logical application by instituting a series of courses in the maintenance and minor repair of the ordinary household appliances.

The course in "Home Mechanics" consists of three lecture-demonstration classes in which enrollment is limited to 20 so that each woman can become thoroughly familiar with the appliances and have an opportunity to personally make those adjustments which are demonstrated. In the first class, which was conducted by Mrs. Mildred Seaberg, Santa Barbara district home service director of the Southern Counties Gas Co., gas appliances such as water heaters, ranges, refrigerators and space heaters are dealt with.

How to keep gas appliances functioning efficiently for the duration—without the aid of the service man—is the subject of the first lecture of the "Home Mechanics" course being given at the Santa Barbara office of the Southern Counties Gas Co. Mrs. Mildred Seaberg, district home service director who is the instructor, is shown above (second (second from left). To her left is a member of A. W. V. S., sponsor of the classes.

Rubber Conservation

By using public conveyances, prerouting service orders by street and by making changes in customer service policies, the Southern California Gas Co., Los Angeles, Calif., has been able to cut down the company car traveled miles by 355,000 in June, or about 40% less than the number traveled the same month in 1941. Even greater savings are anticipated in the future. An idea of the success this company is achieving may be obtained from the following tabulation:

	1942	1941
January	941,000	984,000
February	752,000	881,000
March	695,000	963,000
April	639,000	958,000
May	589,000	945,000
June	555,000	910,000

Experimental trials involving the use of public conveyances, bicycles, horses and plain old Shank's mare have resulted in the United Gas Pipe Line Co., Shreveport, La., being able to pare 50% off the mileage figures formerly registered by their employees in the course of their business travels. Spread over five states, from hills to plains, from swamps to deserts, the United's activities present a difficult problem in conserving transportation. Recently pipe line leak crews have been equipped with a special wagon that contains camping equipment. Maintenance crews are also utilizing horse-drawn vehicles for all work except of an emergency nature in which speed is of the essence.

With every employee cooperating, the Monongahela West Penn Public Service Co., Fairmont, W. Va., managed to slice its 1942 travel figures 740,000 miles in the first six months compared to the same period in 1941. Nearly 640,000 miles were saved in the operation of company owned vehicles and 100,000 in the operation of personally owned cars. These savings were achieved by eliminating unnecessary travel, by doubling up on trips and by the use of public forms of transportation. Instituted in January, the company sponsored campaign to cut driving has been progressive in its results with the absolute minimum of travel not yet reached.

After a thorough trial, some 50 meter readers and collectors of the Pacific Gas and Electric Co., San Francisco, Calif., are now using bicycles in making their rounds in Oakland, San Raphael, Santa Rosa, Petaluma, St. Helena, Eureka, Red Bluff, Chico, Willows, Stockton, Modesto and other communities. The new move not only saves gasoline and rubber but maintenance charges, thus releasing mechanics for other duties. Normally, each man covers from 16 to 20 miles per day.

A. G. A.'s War Time Advertising Program

By H. CARL WOLF

Chairman, Committee on National Advertising

H. CARL WOLF has been elected chairman of the Committee on National Advertising, succeeding Major Thomas J. Strickler, who has served in that capacity since the gas industry's national advertising program was initiated six years ago. Major Strickler will continue as a member of the committee.

News of Major Strickler's desire to retire as chairman was received with regret by the committee at its May 3 meeting in New Orleans, La. After assuring themselves that he would not reconsider his decision to retire, members of the committee nominated Mr. Wolf for chairman, an action later confirmed by a unanimous vote of the committee.

Mr. Wolf is president of the Atlanta Gas Light Co., Atlanta, Ga., and associated companies in southeastern territory. He is president of the Atlanta Chamber of Commerce, a past president of the Indiana Gas Association and the Southern Gas Association, and a past chairman of the A. G. A. Industrial and Commercial Gas Section. He is also a director of the American Gas Association.

THE 1942-43 national advertising program brings to the gas industry new problems, new opportunities. Like other industries operating under priorities and Government regulations, the gas utilities must carry on. Still they must remember that there will come a time when the war will be over and business will get back to a new normal. When that time arrives, the gas industry must be ready to seize every advantage that the post-war period will offer. It must not in the meantime have permitted itself to fall in public estimation.

The committee, in approaching the question of how best the gas industry can advertise in this coming year, has kept these important points in mind:

1. Ways and means of using the industry's advertising to make the strongest contribution towards winning the war.

2. The desire to build prestige for gas is not dependent on selling appliances or on dealing directly with appliances in advertising copy. In dealing with public attitudes, just as much progress can be made during a period when appliances are unavailable as when available.

3. The war situation offers opportunities for presenting the vital services of the gas industry in ways that will not only make a contribution to the war effort, but which can be made an important force in building sounder public and government relations.

In line with the above thinking, a series of four advertisements of a war-effort nature has been designed for publication in the country's three leading weekly magazines, total circulation, 9,650,0000. The first full-page advertisement of this general or consumer series appears elsewhere, scheduled for publication in the *Saturday Evening Post*, September 12; *Life* for September 14, and *Collier's*, September 26. The three additional ads in this series will appear in October, November and December issues of these magazines.

The school of copy followed in these ads aims at the objective of building prestige for gas, but approaches the job in a way which we feel will be more effective for the combined men and women audiences of the general magazines to be used. The contributions that gas is making to the national industrial war program are little short of amazing and yet little known to the general public. The basic idea of this new copy is to present outstanding industrial services of gas in a dramatic fashion and relate them closely to the domestic use of gas by pointing up the fact that the same fundamental qualities — speed, dependability, controllability and economy—make it the preferred fuel in industry and the home alike.

We feel that the copy is so timely and interest compelling as to insure a reading. We believe this reading will greatly enhance the prestige of gas for domestic use. It is advertising that presents basic reasons for the superiority of the fuel—a more valuable message to get across during the war

AMERICAN GAS ASSOCIATION NATIONAL ADVERTISING PUBLICATION SCHEDULE

"War-Effort" Advertisements, 1942

	Sept.	*Oct.*	*Nov.*	*Dec.*
Collier's	26	24	21	19
Life	14	12	9	7
Saturday Evening Post	12	17	14	12

Industrial and Commercial Advertsiing for 1942-43

Fields to be Reached	*Publication*	*Space*
Metals	The Iron Age	6 pages
	Steel	6 pages
	Metals and Alloys	6 pages
	Metal Progress	6 pages
	Heat Treating and Forging	6 pages
Ceramics	Ceramic Industry	6 pages
	Glass Industry	6 pages
Baking	Bakers Weekly	6 pages
Commercial	Hotel Management	6 pages
	American Restaurant	6 pages
	Chain Store Age	6 pages
	Modern Hospital	6 pages
General Manufacturing	Industrial Heating	12 pages
	Business Week	10 pages

COMPARISON ON A RELATIVE COST BASIS OF THE GAS INDUSTRY'S ADVERTISING WITH MANUFACTURERS' STOVE AND RANGE ADVERTISING REGARDLESS OF SIZE OF SPACE OR USE OF COLOR

	Cost
Average cost of interesting 1000 women in The Gas Industry's Range advertising for the period October, 1941-March, 1942	$ 8.55
Average cost of interesting 1000 men readers in The Gas Industry's Range advertising for the period October, 1941-March, 1942	$ 12.40
Average cost of interesting 1000 women readers in manufacturers' stove and range advertising in a two-year period	$ 9.70
Average cost of interesting 1000 men readers in manufacturers' stove and range advertising in a two-year period*	$ 14.28
Average cost of interesting 1000 women in The Gas Industry's "4 Big Jobs" advertising for the period October, 1941-March, 1942	$ 8.05
Average cost of interesting 1000 men in The Gas Industry's "Big 4 Jobs" advertising for the period October, 1941-March, 1942	$ 10.40

*1939, July, 1940-June, 1941.

RUSH ORDER!
COOKED BY GAS!
The little blue flame that cooks your meals, that warms your house . . . is a roaring giant in wartime.
It is helping turn steel into weapons of war at a rate that's smashing all records for speed.
It is "cooking" whole battleship turrets at one time in ovens as big as a five-room house.
It is helping make 155 mm. shells three times as fast as formerly.
Tanks and guns and bombs and bullets . . . torpedos and planes and gas-masks and ships . . .
Gas is used to make them all!
And for the very same reasons 85,000,000 Americans prefer Gas for cooking.
Because it's fast, saves time. Because it's economical and clean. Because it's flexible, instantly adjustable to exact temperatures. Because it's famous for greater dependability!
AMERICAN GAS ASSOCIATION
GAS—THE WONDER FUEL FOR COOKING NOW SPEEDS WAR PRODUCTION
Buy United States War Bonds and Stamps

The opening gun in the American Gas Association's seventh year of National Advertising is this forceful full page exposition on the industry's war time potency. Look for it in Saturday Evening Post, September 12; Life, September 14, Collier's, September 26.

period than the details of appliances and their operation.

It seems highly probable that both natural and manufactured gas will have to be curtailed at least in some localities to make way for war production. This situation is met in some measure by this type of advertising even without any direct mention of curtailment or conservation, for it informs and educates the customers of the gas industry that the same gas they use for cooking and heating is a vital product in war manufacture.

One feature of this war-effort series which has given it strong support is the availability of the national ads in mat form for publication in local newspapers.

The Committee has given careful thought to sponsoring a series of ads promoting nutrition and food conservation for publication in the women's magazines but no ads of this nature have been planned for the balance of the current year.

The publicity program, a hand maiden of the advertising program, covering both newspapers and magazines will be carried on as formerly. It will inform American women how to cook modern foods with gas. It will inform the public on the importance of nutrition in war-time, how to cook foods to secure maximum nutritional benefits, how to make their present equipment last, and, if necessary, of the need for conservation and how to conserve. And in informing them of these many things, the basic, all-important story the industry must continue to emphasize, the story of the modernity of gas, will continue to be told, subtly, continually, interestingly and forcefully along a wide front.

Industrial, Commercial Advertising

As a result of the unprecedented demand for industrial gas caused by the war, the gas industry has a golden opportunity—and one which may never come again—to entrench itself so solidly in industry that its future, particularly in the difficult post-war period, will be assured. It was felt that the publicizing of the spectacular role that industrial gas was and is playing in our all-out war program—its immediate, direct and dramatic contribution to war-production—would build goodwill, and prestige for the gas industry.

Inherent in such advertising is, of course, the suggestion to the reader that he investigate what gas might be able to do for him to help speed his production. Advertising copy has stressed the specialized knowledge and experience of the gas industry, and has consistently offered the services of the local gas company to those interested in learning how gas can help them.

This type of advertising accomplishes three very important results. It builds prestige for industrial gas—and for the whole gas industry. It sells the idea of industrial gas to non-customers, and thus points the way to speedier production, which in turn is a direct contribution to our national war effort. And it builds for the future of gas by developing a clear-cut recognition of what gas can do for industry.

As far as advertising copy is concerned, it is planned to have it all keyed definitely to the war program,

The Electric Industry Looks to the Future

WHEN the war is over there will be more electric current available than ever before; electric appliance manufacturers will have greatly expanded facilities; and it is unlikely that the electric industry will fail to take advantage of this opportunity to extend the use of electricity in both homes and industries.

Today a group of some 60 electric utility companies* are financing a national advertising campaign involving an expenditure of over $400,000. The basis of assessment is 7c per meter for the first 100,000 meters and 6c for the next 200,000. According to all reports this campaign is gaining additional financial support every month.

In view of this situation, this is a time when gas advertising should at least be held up to the past level or even stepped up; when the industry should demonstrate a vigorous and enthusiastic determination to hold its present position and obtain an increased volume of favorable public opinion and prestige.

*The number of electric companies sponsoring this campaign has increased each month. The second advertisement in this series, appearing in January, 1942, was sponsored by 54 companies (*GAS*, February, 1942, page 17).

with a series of advertisements which will combine the prestige story of gas with the offer of service by gas company industrial engineers to help customers get maximum efficiency out of their present gas equipment. Such engineering service will help customers to get greater production out of their present gas equipment; it will help in the important task of conserving gas and in making present equipment last longer, both of which accomplishments bear directly on our war effort. And, in addition, it will be a valuable prestige and good-will builder for the entire gas industry.

The year 1941 was a record year in industrial and commercial gas sales—accounting for 64.3% of total gas sales and 35.1% of total revenues. The present year will probably surpass 1941, emphasizing the growing importance of industrial and commercial gas, and suggesting the wisdom of continuing to publicize the vital contribution which the gas industry is making toward the winning of the war.

The foregoing presents a summarization of the plans developed for the seventh year of national advertising. It is a strong campaign—highly informative and helpful. Furthermore, it is strictly in keeping with the times. In this latter respect, however, the Committee wishes to emphasize the point that, while we have a campaign plan in mind for the next 12 months, everything in that plan is completely flexible.

Actual advertisements are being prepared, one or two at a time, so that necessary changes can be made quickly, or, if unforeseen events occur, the entire advertisement can be altered accordingly; space schedules, too are subject to such changes as may be required

The present is a time of test and uncertainly; it is also a time of opportunity for those individuals and industries who have the foresight and courage to forge ahead, to plan for the future. We believe that the gas industry has the foresight, the courage and the resourcefulness to take a forward outlook now, and it is for that reason that we bespeak the gas industry's support of this 1942-43 campaign.

The Improving Standards of Gas Heating

By R. M. CONNER

Director, American Gas Association Testing Laboratories, Cleveland, Ohio

SIXTY PER CENT of all new U. S. homes constructed in 1940 were equipped with central gas heating equipment. In natural gas territories, this figure increases to more than 90%. Moreover, the total number of appliances sold during 1941 exceed those sold during the preceding year by more than 50%.

R. M. CONNER

Practically all central heating gas appliances offered for sale in the United States and Canada are first tested and approved at the American Gas Association Testing Laboratories. An analysis of the requirements that must be met before such appliances are permitted to display the Laboratories' Approval Seal reveals the high standard of construction and performance which are the basis for this widespread public acceptance. Since the first set of these standards became available in 1927, they have been constantly revised and expanded to keep them abreast with latest developments and improvements. As an indication of the rapid progress made, current American Standard Approval Requirements for Central Heating Gas Appliances which became effective January 1, 1941, represent their Eighth Edition.

As shown by Laboratories' records, each new edition of these requirements stimulated additional developments and improvements in central heating gas equipment. To mention only a few examples, thermal efficiencies of warm air furnaces equipped with blowers have been increased by as much as 15% over those available several years ago. Similarly, gravity and floor furnace efficiencies have been increased approximately 7%. Boiler efficiencies on the average have also been improved so that it can be claimed that the ultimate in heating efficiencies is being rapidly approached.

At this time recommended revisions for the Ninth Edition of the American Standard Approval Requirements for Central Heating Gas Appliances have already been distributed to the industry.

One of the most important modifications of the current standards is a substantial strengthening of combustion tests which all central heating gas appliances must meet. Whereas current requirements provide that samples of combustion products be taken when a boiler or furnace adjusted at normal pressure is operated at 0.5 and 1.5 normal pressures at the inlet of the gas pressure regulator, present revisions specify that samples be taken at 0.5 normal pressure at the inlet of the regulator and at a pressure 25% above that obtained during burner adjustment at the outlet of the regulator. As all such appliances are provided with gas pressure regulators, it may be readily seen that the suggested revision requires satisfactory operation over a much wider range of pressures than currently required.

Obviously the larger factor of safety which would automatically follow adoption of this proposed procedure has many advantages. Principally it eliminates the great hazard of over-rating by unauthorized individuals to whom ratings specified on the name plate convey no particular significance. This fact is particularly important today in view of modern tendencies in designing package "vest-pocket" models to burn more gas per cubic foot of combustion space than heretofore even thought possible. As may also be apparent, the majority of central heating appliances are now rated at their maximum capacities consistent with satisfactory combustion and efficiency standards as determined at our Testing Laboratories. Any attempt to increase the rating of a unit in the field may thereby nullify the advantage gained from Laboratories' certification and result in unsatisfactory performance so far as combustion is concerned.

In view of the large percentage of central heating gas appliances which are now constructed with all controls enclosed within the jacket of the unit, it was also felt that provision should be made for satisfactory operation with the chamber control panel open or closed. Similarly, it was felt that combustion characteristics of fan type furnaces should not be affected when operating against a static pressure of

0.2 in. equivalent water column imposed on the system by a restriction at the end of the outlet air duct. The methods of test designed to cover these conditions requires a comparison of flue gases which are taken with the control chamber panel in place or removed, and in the case of forced-air furnace, with 0.2 in. static pressure imposed or eliminated.

Safety Measures Adopted

Another modification, proposed in the interest of safety, sets a maximum rise above room temperature which may be reached on the floor under a forced-air type warm-air furnace. The need for this provision has been made evident by an increasing trend toward installations of units of this kind on wood floors in utility closets of small unexcavated homes and individual apartment suites. To assure the same degree of safety on floors as is now provided on ambient combustible walls under usual installation conditions, it was considered advisable to adopt a similar provision against excessive temperatures. Simulating the severest operating conditions, a unit is operated for one hour at 1.5 normal gas pressure against a static pressure of 0.2 in. imposed on the outlet warm-air system. At the end of this period, temperatures of the floor as indicated by iron-constantan thermocouples spaced at 6-in. intervals in the floor must not exceed 90° F. above room temperature.

Perhaps the most revolutionary addition is a suggested section on allowable heating element temperatures. This provides that all parts of a heating element which comes in contact with the flue gases shall attain a temperature of not less than 178° F. within an indicated period of time from a cold start and that no external surface of the heating element shall exceed 875° F. after continued operation. The purpose of this test is to set up operating conditions under which corrosion of the heating surfaces would be minimized to such an extent that steel elements of thicknesses commonly employed would provide a satisfactory life expectancy. This test was devised after an extensive investigation of literature and direct observation of performance of contemporary units. The conclusions were further substantiated by results from a survey of actual field experience of a large and representative group of utilities.

It was found that at temperatures above 900°, flue gases have an appreciable corrosive effect on iron, steel, and their alloys. Furthermore, corrosion is accelerated as temperatures are increased above the initial scaling temperatures. Similarly, when flue gases are cooled by contact with a surface where the temperature is below the dew-point of the flue gas mixture, water condensate is formed. This condensate serves as a solvent, forming an acid solution, thereby providing a corrosive action. The minimum temperature of 178° now specified is well in excess of dew-point temperatures resulting from normal operating conditions. It may thus be readily seen that the allowable heating element temperatures selected are within that temperature range in which a minimum amount of scaling and corrosion takes place. Consequently, increased life expectancy from normal operation of such heating elements should be provided. In addition to the above provisions, another important change, applying to furnaces, is an increase in thickness of metal employed in construction of heating elements, an increase of nearly 20% in thickness being specified. This tends to still further increase service life.

While I have briefly discussed the more outstanding modifications being considered at this time, many other revisions have been included which will further strengthen these American Standards for central heating gas appliances. Special mention may be made of some of particular interest from the servicing standpoint. To facilitate inspection of heating elements of warm-air furnaces, a readily accessible opening for this purpose is required. All flue passages must also be accessible for cleaning and inspection without need of major dismantling or removal of controls. Another addition requires permanent marking of units with lighting and shut-down instructions. This will undoubtedly reduce the number of service calls which are made annually.

Further research on central heating equipment dealing with fundamentals of design and performance are now being conducted at our Laboratories under supervision of the American Gas Association's Committee on Domestic Gas Research. Three progress reports covering fundamentals of heat transfer and furnace noise have already been issued. A fundamental study of atmospheric type burner design has also been extended to include central heating gas burners.

I would also like to call your attention to the remarkable progress also being made in gas summer air conditioning. An extensive testing and research project in this field was recently undertaken at our Laboratories. Already an outstanding economic and engineering survey of gas summer air conditioning has been published. Work is now under way in testing contemporary equipment along carefully planned lines. It seems logical that development of American Standards in this field will follow. Representing one of the greatest potentialities of enlarging the services of the gas industry to its residential customers, it is a fitting compliment to winter air conditioning.

All-Gas Equipment Serves Navy Cadets

CAPT. Alva D. Bernhard, commandant of the Corpus Christi (Texas) Naval Air Station, recently praised the efficiency and cleanliness of the modern all-gas kitchens of Texas A. & M. College, located at College Station, where several thousand United States Navy cadets will begin training.

In responding to President Walton's address of welcome given at a midafternoon meeting, Capt. Bernhard said: "We are particularly proud to have our first naval contingent come to Texas A. & M. I was on your campus last fall for a football game and I had dinner that evening with 6000 cadets in your mess halls. The job of feeding them went off like clockwork. I went into your kitchens and I will say that they were as clean and immaculate as my galley on the U. S. S. Lexington, which is the highest praise I can give them."

The A. & M. kitchens are all-gas equipped with modern, thermostatically controlled heavy-duty appliances which have effected savings in fuel costs, reduced meat shrinkage and cooking oil consumption. Through modern gas equipment and a well-managed subsistence system, the cost per meal at A. & M. has been reduced from 26⅔¢ in 1937 to 21¢ in the spring of 1940.

Equipment is divided into six batteries: a roasting oven battery of six large double-oven roasting ovens; two batteries of fryalators, totaling 20 in number; a battery of 10 Magic Chef ranges; a special gas-fired hot-cake griddle containing 56 burners; and a battery of 10 heavy-duty broilers and ovens. In addition, five kitchen appliances use steam generated by gas.

The Navy cadets will start courses immediately in radio material and operation under the direction of M. C. Hughes who is head of the electrical engineering department at Texas A. & M. University.

PACIFIC COAST GAS ASSOCIATION SECTION

A Resume of the Association's Activities in this First Year of the War

Annual Meeting in San Francisco

NO three color announcements. No golf tournament. No banquet. No entertainment for the ladies or anyone else. No long winded speakers. No registration fee. That will be the 49th Annual meeting of the Pacific Coast Gas Association, as announced last month by Managing Director Clifford Johnstone. There will be a meeting, however—a strictly business, war time meeting, convening under the direction of President R. S. Fuller of the Pacific Gas and Electric Co. at 10:00 A.M., Friday, September 4 at the St. Francis Hotel, San Francisco.

In the two hours from 10:00 A.M. until noon there will be the reports of the President and Section Chairmen, the election of officers and the report of the Awards Committee. All members are invited to this session. The afternoon will be devoted to meetings of the Board of Directors and such other executive groups as may be called together by Section or Committee Chairmen.

Program

Time: 10:00 A.M., September 4, 1942.
Place: St. Francis Hotel, San Francisco.

President's Address

R. S. Fuller, President, Pacific Coast Gas Association.

Report of Chairmen

Accounting Section, L. W. Coughlan, Pacific Gas and Electric Co.

Manufacturers Section, E. L. Payne, Payne Furnace and Supply Co.

Sales and Advertising Section, J. E. Kern, Southern California Gas Co.

Technical Section, H. P. George, Southern California Gas Co.

Cooperative Advertising, J. S. Spaulding, Southern California Gas Co.

Women's Committee, Dorothy Henriksen, Pacific Gas and Electric Co.

Election of Officers

Report of Awards Committee

H. W. Edmund, Coast Counties Gas and Electric Co.

Special Luncheon Meetings, 12:30 P. M.

Board of Directors and Section Chairmen.

Women's Committee.

Manufacturers Section Annual Meeting.

Report of Chairman.

Election of Officers.

The morning meeting is a General Session open to all Association members. Attendance at the noon luncheons is limited to members of the special groups as indicated.

Nominations

General

The General Nominating Committee, A. E. Holloway, chairman, will make the following nominations at the Annual Meeting:

For President: F. M. Banks, vice president, Southern California Gas Co., Los Angeles.

For Vice President: E. L. Payne, vice president and general manager, Payne Furnace and Supply Co., Beverly Hills, Calif.

For Treasurer: D. G. Martin, general auditor, Pacific Gas and Electric Co., San Francisco.

For Directors (2 year term): R. G. Barnett, vice president and general manager, Portland, Ore. Gas and Coke Co.; E. H. Coe, president, Central Arizona Light and Power Co., Phoenix, Ariz.; H. W. Edmund, sales manager, Coast Counties Gas and Electric Co., Santa Cruz, Calif.; F. A. Woodworth, president Spokane, Wash. Gas and Fuel Co.

For Director (one year term to fill unexpired term of C. O. Menig, resigned) A. H. Sutton, president, Mission Water Heater Co., Los Angeles.

Manufacturers Section

The Nominating Committee for the Manufacturers Section, Ralph S. Bailey, Los Angeles, chairman, will make the following nominations at the Annual Meeting:

For General Chairman: A. H. Sutton, Mission Water Heater Co., Los Angeles.

For General Vice-Chairman: E. T. Howard, General Controls Co., Glendale, Calif.

Accessories Division: For Chairman: J. J. Delaney, Reliance Regulator Corp., Alhambra, Calif.; *For Vice-Chairman:* Dean Violett, H-M Thermo Control Co., Los Angeles.

Heating Division: For Chairman: F. C. Packer, Payne Furnace and Supply Co., Beverly Hills, Calif; *For Vice-Chairman:* W. V. Fitch, Utility Fan Co., Los Angeles.

Range Division: For Chairman: C. Roy Ohnimus, Hammer-Bray Co., Oakland, Calif.; *For Vice-Chairman:* W. M. Couzens, Gaffers & Sattler, Los Angeles.

Water Heater Division: For Chairman: E. S. Hoyt, Jr., Hoyt Heater Co., Los, Angeles.; *For Vice-Chairman:* R. W. Tarleton, Southern Heater Co., Compton, Calif.

Directors of A.G.A.E.M.: A. H. Sutton, and E. T. Howard, with F. C. Packer and C. Roy Ohnimus as alternates.

Activities for 1943

President-to-be F. M. Banks will ask approval of the following appointments:

General Chairman Accounting Section: P. W. Walters, Southern California Gas Co.

General Chairman Sales Section: R. J. Phillips, San Diego Gas and Electric Co.

General Chairman Technical Section: F. F. Doyle, Pacific Gas and Electric Co.

Chairman Cooperative Advertising Committee: A. C. Joy, Pacific Gas and Electric Co.

Chairman Women's Committee: Gladys Warren, San Diego Gas and Electric Co.

Because of the war it is not expected that committees can schedule any general meetings during the year. Instead a plan will be presented which will permit each Section to hold a limited series of meetings on special subjects inviting one representative from each gas company to attend each meeting. The invitation in each case will be extended through the company which will select its own representative.

1942 in Review

Because of the war the activities of the various Sections and Committees of the Association were greatly curtailed. The cancellation of the scheduled Annual Convention which was to have met in San Francisco with the American Gas Association was also a factor limiting productive effort. However, exceptional work and progress was made by the Accounting Section, primarily because of the schedule of

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committee meetings which it adopted. While formal statements by Section Chairmen appear on following pages, it is well to recap here briefly the work done during the past year.

Accounting Section, (L. W. Coughlan, Chairman): During the current year this section held five meetings. All of them were invitational. Invitations were extended by the Section Chairman to the chief accounting executives of member gas companies. Four of the meetings were on specialized subjects, these subjects being Internal Auditing, Payroll Accounting, Purchasing and Stores Accounting, and Construction Costs Accounting. The fifth meeting was an Executive Committee meeting devoted primarily to the discussion of priorities, the reports of sponsors of other meetings, and the delivery of three papers.

Sales and Advertising Section, (J. E. Kern, Chairman): The Executive Sales Conference was the only meeting held by the Section during the year but in addition the Section sponsored the distribution to gas company sales executives of a large number of current advertisements, bulletins, sales plans, etc. Distribution was made through this office. Also five Gas Utilization Data Bulletins worthy of publication were submitted during the year and distributed to members of the commercial and industrial groups. The Home Service Committee of the Section secured a letter from one of its members each month during the year which we have mimeographed and distributed to Home Service women.

Technical Section, (H. P. George, Chairman): This section had only one meeting during the year, this being a two day Conference. This Conference was well up to the standard of previous years, upward of 20 papers and reports being submitted. These papers and reports reflected the current activities of the companies and were concerned with defense preparations.

Manufacturers Section, (C. O. Menig and E. L. Payne, Chairmen): This section held no general meetings but there were numerous meetings of its Executive Committee and various product groups. Most of these meetings were concerned with priorities and limitations, and their principal benefit was in keeping manufacturers informed and in aiding in the collection of information required by the War Production Board.

Women's Committee, (Dorothy Henriksen, Chairman): This committee held no meeting during the year but its Chairman mailed out frequent editions of "Public Utility Women" passing along ideas and inspiration to the chairmen of individual company committees. Two contests are in progress, the Year Book and an Essay Contest.

Immediately after Pearl Harbor the Association inaugurated a series of Defense Bulletins outlining the measures being taken by each company to protect its personnel and property against sabotage and enemy action. Some 15 of these bulletins were sent out during a three-month period.

P. C. G. A. LEADERS DURING 1941-1942

GENERAL OFFICERS

President: R. S. Fuller, engineer gas construction and operation, Pacific Gas & Electric Co., San Francisco.

Vice president: F. M. Banks, vice president, So. California Gas Co., Los Angeles.

Treasurer: D. G. Martin, general auditor, Pacific Gas & Elec. Co., San Francisco.

Managing director: Clifford Johnstone.

TECHNICAL SECTION OFFICERS

General Chairman

H. P. George, general superintendent, Natural Gas Production and Transmission, So. California Gas Co., Los Angeles.

Committee Chairmen

Distribution: R. L. Cook, division superintendent, Southern California Gas Co., Glendale, Calif.

Transmission: F. F. Doyle, manager, Natural Gas Division, Pacific Gas and Electric Co., San Francisco.

Utilization: H. W. Geyer, utilization engineer, So. Counties Gas Co., Los Angeles.

SALES AND ADVERTISING SECTION OFFICERS

General Chairman

J. E. Kern, general supervisor, Domestic Sales, So. California Gas Co., Los Angeles.

Committee Chairmen

Commercial and Industrial Sales: C. L. Ferry, industrial engineer, Southern Counties Gas Co., Los Angeles.

Home Service: Mrs. G. J. Meyer, home service department, Southern California Gas Co., Los Angeles.

Domestic Sales: R. J. Phillips, engineer in charge of gas sales, San Diego Gas and Electric Co., San Diego.

ACCOUNTING SECTION OFFICERS

General Chairman

L. W. Coughlan, chief clerk, Pacific Gas and Electric Co., San Francisco.

Conference Chairmen

Internal Auditing: Harry McGann, chief traveling auditor, Pacific Gas and Electric Co., San Francisco.

Payroll Accounting: George Kelly, special accountant, Southern California Gas Co., Los Angeles.

Purchase and Stores Accounting: J. P. Schaefer, purchasing agent, Coast Counties Gas and Electric Co., Santa Cruz.

Construction Cost Accounting: George R. Gray, engineer, San Diego Gas and Electric Co.

MANUFACTURERS SECTION OFFICERS

Chairmen: E. L. Payne, vice president, Payne Furnace & Supply Co., Beverly Hills; C. O. Menig, formerly with Pacific Gas Radiator Co., Huntington Park.

Vice chairmen: R. G. Logue, vice president, Ward Heater Co., Los Angeles; A. F. Rice, formerly with Occidental Stove Co., San Francisco.

COMMITTEE CHAIRMEN

Cooperative Advertising: J. S. Spaulding, advertising manager, Southern California Gas Co., Los Angeles.

Women's Committee: Dorothy Henriksen, Pacific Gas & Electric Co., Fresno.

TECHNICAL SECTION

Statement of the General Chairman

By H. P. GEORGE

General Chairman, Technical Section, Pacific Coast Gas Association.

THE first wartime conference of the Technical Section convened at the Ambassador Hotel in Los Angeles, May 21 and 22, 1942. The organization of the Pacific Coast Gas Association on July 11, 1893, of course, antedates World War I and the Spanish American War, but the Technical Section as now constituted is undergoing its first experience under actual war conditions.

In World War I there was some shortage of food stuffs and durable goods. Thousands of men answered the call to the colors and millions of dollars was subscribed in Liberty Bonds, but the control of production of critical material and the rationing of supplies on the tremendous scale of our present program, have been heretofore unknown to us.

Every contributor to the program this year carried an extraordinary load imposed by the present emergency in addition to the work done for the Association. Under those conditions, it was quite natural that we should forego some research and new development work and devote our time and energy to the more pressing problem of adapting ourselves and our industry to the new conditions and, therefore, the theme of the conference was "The Pacific Coast Natural Gas Industry in War."

Many interesting subjects were presented which were not directly related to the war, but most of our time was devoted to the discussion of methods of protection of vital plants and pipe lines against sabotage, organization and mobilization of repair crews, methods of emergency repair and reconstruction of facilities destroyed, the effect of the impact of the war and the present rubber shortage on our construction and maintenance program, and the effect of these elements on our customer service program and our relations with our customers.

The subjects were well presented and in general were of such nature that encouraged and developed full and free discussion.

In planning a program for the future, officers of the Technical Section realize that conferences of the type normally held during the past must be dispensed with for the duration of the war. This must, of necessity, bring about some curtailment of Association activity, but the value is also recognized of maintaining contacts between members of the Association working on similar problems, for the exchange of ideas and experiences.

A plan is now being developed under which problems of particular interest would be considered by small groups of specialists. Their findings would be recorded and prepared for distribution to interested parties within the Association.

We are of the opinion that by such means the essential work of the Association can be carried on without serious interference to the war activity.

Predicting Temperature Distribution Along Gas Transmission Pipe Lines

By ROBERT V. DUNKLE

Pacific Gas & Electric Co., San Francisco, California

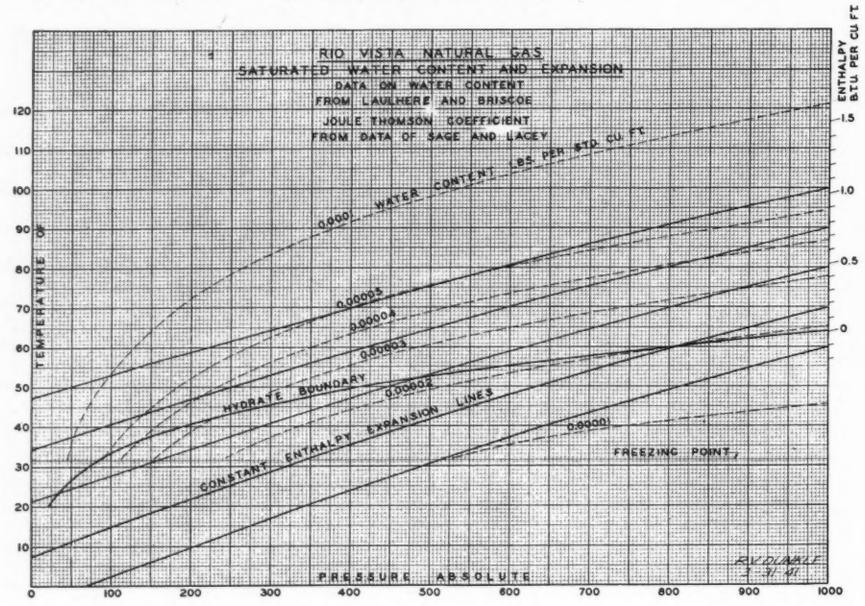
THE prediction of the temperature distribution along a gas transmission line is of great importance in determining the possibility of hydrate formation and the quantity of water condensate at various points along the line.

If a constant quantity of gas is flowing through a pipe the temperature change of the gas will be due to three effects: (1) heat may flow by conduction through the ground into the gas, or vice versa, causing a temperature rise or fall in the gas as it flows along the pipe; (2) there will be a temperature drop in the gas due to the Joule-Thomson effect, which is the change in temperature with pressure at constant enthalpy; (3) as the velocity of the gas in successive downstream sections increases due to the lower pressure, the temperature of the gas must decrease, if no heat transfer takes place, to maintain a constant total energy in the gas stream. In the ordinary problems concerning gas transmission lines, it is found that this last effect is negligible, and that it is necessary to consider only heat transfer through the ground and Joule-Thomson effect.

When the line is being packed or drafted or considerable changes in load occur, the methods of calculation given herein do not strictly apply. For example, when the line is being packed the temperature of the gas will rise due to compression, and when the line is drafted the temperature of the gas will fall. These effects of pack and draft are minimized, however, due to the large heat capacity of the pipe, the high transfer factor from the gas to the pipe, and the fact that the change takes place rather slowly. The effect of changes in the quantity of gas flowing is not immediate, as it takes some time for the heat flow to reestablish a steady state, and as a result the gas temperature will change slowly to the predicted temperature for the new conditions.

Heat transfer may either tend to raise or lower the gas temperature, while under flow conditions the Joule-Thomson effect tends to reduce the temperature as the gas flows downstream. Either of these two effects may be dominant, depending on the conditions of flow. The heat loss from the buried pipe line is calculated by the equation for heat flow from a linear heat source.

The temperature drop due to the Joule-Thomson effect is obtained from the pressure—temperature—enthalpy chart (Fig. 1) for Rio Vita natural



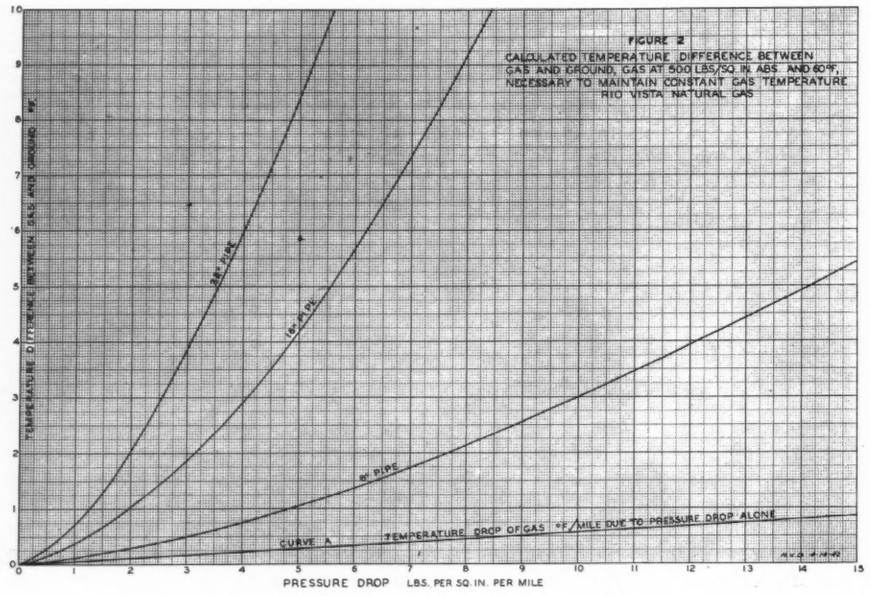
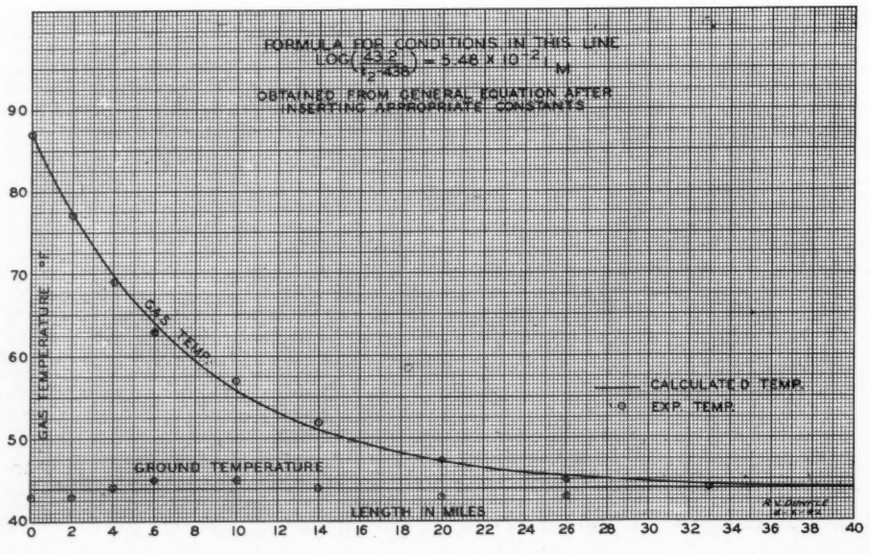


FIGURE 2
CALCULATED TEMPERATURE DIFFERENCE BETWEEN GAS AND GROUND, GAS AT 500 LBS./SQ. IN. ABS. AND 60°F. NECESSARY TO MAINTAIN CONSTANT GAS TEMPERATURE RIO VISTA NATURAL GAS
TEMPERATURE DIFFERENCE BETWEEN GAS AND GROUND °F.
36" PIPE
18" PIPE
8" PIPE
CURVE A
TEMPERATURE DROP OF GAS °F./MILE DUE TO PRESSURE DROP ALONE
PRESSURE DROP LBS. PER SQ. IN. PER MILE



AT LEFT:

ABOVE: FIG. 1. Rio Vista Natural Gas—saturated water content and expansion.

CENTER: FIG. 2. Calculated temperature difference between gas and ground, gas at 500 lb. per sq. in. abs. and 60° F., necessary to maintain constant gas temperature—Rio Vista natural gas.

BOTTOM: FIG. 3. Temperature in gas transmission line—a check of formula vs. Deaton and Frost data, American Gas Journal, June, 1937, p. 17 — "Gas Hydrates in Natural Gas Lines."

• •

gas. On this chart the constant enthalpy lines represent expansion lines when no heat transfer takes place. This chart was designed for predicting conditions downstream from a pressure regulator, although in cases of high pressure drops in large pipes it closely approximates the gas temperature. The lines of constant water content indicate whether water will condense out of the gas or tend to evaporate, as they indicate the maximum quantity of water vapor which the gas can hold at the particular temperature and pressure under consideration. The curve labeled "Hydrate Boundary" shows the highest temperatures at which gas hydrates are stable. As long as the state of the gas is above this line, no trouble with hydrates can occur.

Although the temperature drop due to velocity increase is ordinarily very small compared to the heat transfer and Joule-Thomson effects, there may be some instances in which it is effective, so the equation is here given:

$$t_1 - t_2 = \frac{M}{2g \times 778\ C_p} (U_2^2 - U_1^2)$$

or for Rio Vista Gas

$$t_1 - t_2 = 0.000040\ (U_2^2 - U_1^2)$$

Where

t = temperature (°F)
U = gas velocity (ft/sec)
G = gravity constant = 32.2 (ft/sec^2)
C_p = Heat capacity at constant pressure (B.t.u./Mol)
M = Molecular weight of gas

These different temperature effects are combined in a single equation for calculating the temperature distribution along the pipe as follows: Considering a short length of pipe "dx," it can be said that the gas temperature change in this distance is equal to the sum of the three effects, or the temperature change due to conduction losses plus the temperature change due to the Joule-Thomson effect and the velocity change.

The equation is then

$$dt = \frac{2\pi K\,(t - to)\,dx}{-2.303\,Q\,C_p \log \frac{(2D-R)}{R} + k\,dx}$$

Where

K = Thermal conductivity of ground (B.t.u./(ft²) (hr) (°F/ft)
t = gas temperature (°F)
to = ground temperature (°F)
Q = Standard cubic feet per hour flowing
C_p = heat capacity at constant pressure (B.t.u./ft3)
D = depth to centerline of pipe (inches)
R = Outside radius of pipe (inches)
k = Temperature change per unit length of pipe due to the Joule-Thomson effect and velocity change.

In order to simplify this equation let

$$a = \frac{2\pi K}{2.3Q\,C_p \log \frac{(2D-R)}{R}} = \frac{1.186\,K}{Q\,C_p \log \frac{(2D-R)}{R}}$$

then

$$dt = -(at - [at_o + k])\,dx$$

and on integration

$$\log \frac{\left(t_1 - (t_o + \frac{k}{a})\right)}{t_2 - (t_o + \frac{k}{a})} = \frac{ax}{2.303}$$

The procedure when using this equation is to calculate "a" from the pipe line conditions. "k" is next found by obtaining the temperature change for a constant enthalpy in expansion from the upstream to the downstream pressure and dividing by the length in feet of the pipe line. The gas temperature, "t_2," can then be found at any distance, "x," from the start of the line.

In the equation above, the term $\frac{\text{"k"}}{a}$ represents the temperature difference between the ground and gas, which would be necessary to hold the gas temperature constant. In other words, the gas temperature at which heat conduction from the ground is just sufficient to counteract the temperature drop due to the Joule-Thomson and velocity effects. In Fig. 2 this term is plotted against the pressure drop per mile for several pipe sizes, showing how greatly the pressure drop and pipe size affect the minimum temperature which the gas can reach. The temperature drop per mile, if no heat transfer takes place, is also plotted (Fig. 2, curve A) against the same scale for the purposes of comparison.

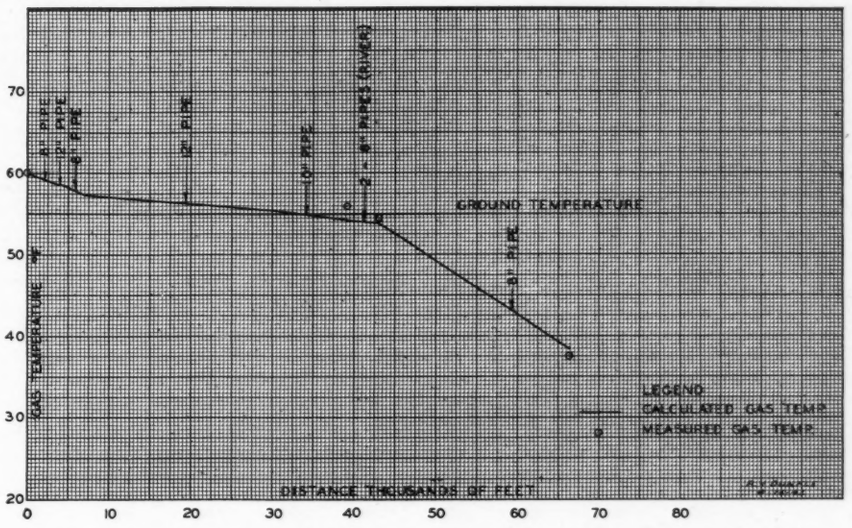


FIG. 4. Temperature in gas transmission line, calculated vs. actual on Natural Gas Corp. of California East Rio Vista line. Rate of flow equals 47,000,000 cu. ft. per day.

Checks of the equation against experimental data are shown for two different pipe lines under very different conditions. In the first example (Fig. 3) the data of Deaton and Frost are plotted against the theoretical curve. In this case the Joule-Thomson effect is negligible and the conduction losses account for most of the drop in temperature. In the second case (Fig. 4) data on the Natural Gas Corp. of California line from the East Rio Vista field were checked, in this case most of the temperature drop being due to the Joule-Thomson effect.

By means of these equations and the temperature-pressure-enthalpy chart it is possible to calculate how much the gas must be heated to prevent trouble, how much heat is required, whether or not hydrates will form at any point, and the location and quantity of water condensate. If the gas is to be dehydrated, it is possible to predict how much water vapor must be removed, and what dew point is allowable in the gas leaving the dehydration plant.

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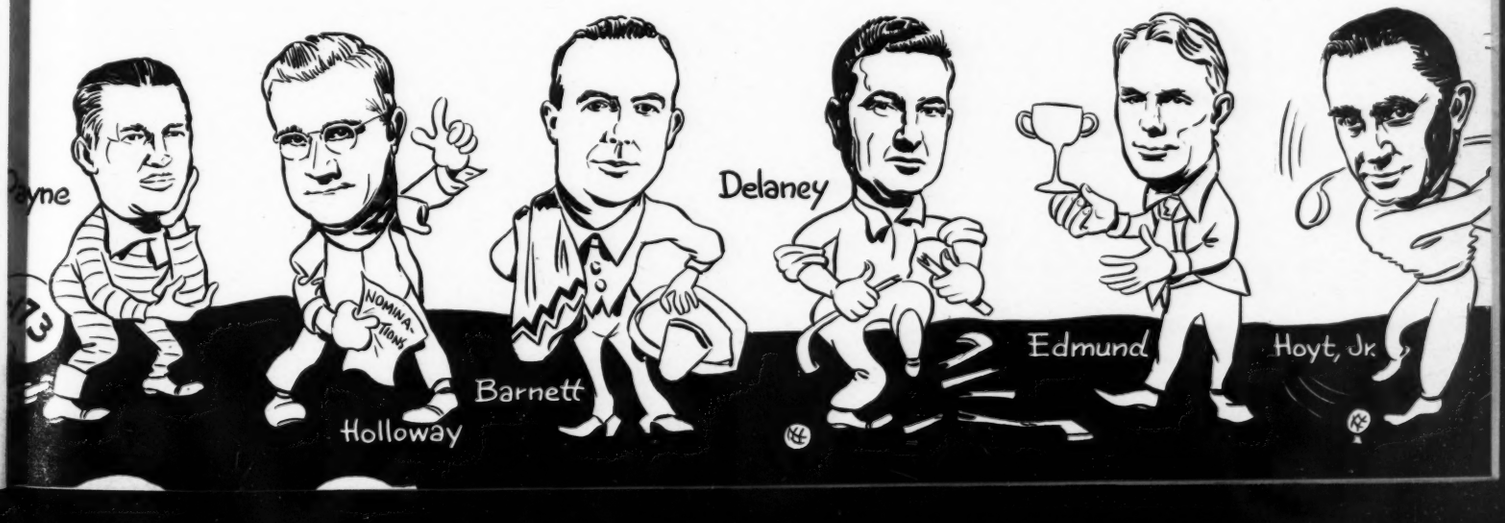


Venting of Domestic Gas Appliances

By T. H. GILBERT

Southern California Gas Co., Los Angeles, California*

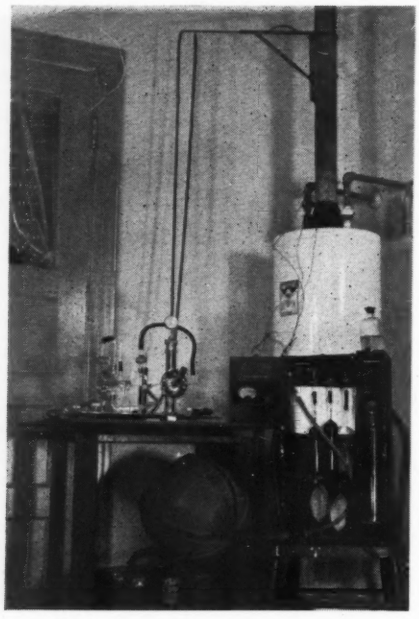


FIG. 1

THE choice of proper flues for various types of gas appliances involves so many variables, such as average flue temperature, outside air temperature, air dilution, and resistance, that the ideal flue can be determined only by engineering each individual installation. Since this method is not generally practicable because of the large staff of men required for such a project, it is necessary to simplify the procedure by assuming certain values for each of the variables, thus making it possible to compile a table of capacities for flues of various heights that might be incorporated in an ordinance.

In the original work done by Frank Wills[1], the average temperature of the stack gases was assumed to 150°F. with a temperature differential of 90°F., and the air dilution at the draft diverter was taken as 100%.

At a later date, this work was revised by Mr. Wills[2] as more experience was acquired and more data became available. The revised work was based upon the requirements which gas appliances must pass before securing approval of the American Gas Association Testing Laboratory. The average temperature of the stack gases was then assumed to be 200°F. with a temperature differential of 140°F., the air dilution at the draft diverter was taken as 25%, and the assumed value of total resistance to flow was reduced an amount equal to the resistance of 30 diameters of straight flue (friction factor=0.0083).

Field Investigations: In order to determine whether or not the above assumed values could be applied in Southern California, a field survey of a variety of water heater and furnace installations was conducted in the Los Angeles area so that data obtained could be applied, together with the previous work done by Mr. Wills, to the development of standards in venting designs for Southern California conditions. A typical installation with some of the test equipment is shown in Figs. 1 and 2.

The following data were recorded during the investigation.

TABLE NO. 1. SUMMARY OF RESULTS OBTAINED FROM FIELD INVESTIGATIONS OF FURNACES

		Closet Installations 6	*Basement Installations* 10
Number Tested (16)			
Flue			
Length, Ft.	Minimum	8.46	21.40
	Average	14.92	34.60
	Maximum	24.00	53.38
Height, Ft.	Minimum	6.92	14.09
	Average	10.07	23.49
	Maximum	13.50	33.43
Diameter, Inches		4 & 5	3, 4, 4½, 5, 6, & 8
Fittings	Cowl	1	1
	90° Ells	1	3
	45° Ells	2	2
	Siamese	0	3 in 10 Installations
	Y	0	2 in 10 Installations
Temperatures, °F.			
Outside	Minimum	56	51
	Average	64	60
	Maximum	72	72
Room	Minimum	75	61
	Average	80	71
	Maximum	89	84
Below Draft Diverter	Minimum	440	420
	Average	498	507
	Maximum	585	665 (Floor Furnace)
Average Stack	Minimum	265	107
	Average	311	152
	Maximum	356	244
Flue Gas Analysis			
% Excess Air Below Draft Diverter	Minimum	32.0	15.1
	Average	55.9	53.9
	Maximum	74.9	89.0
%Air Dilution at Draft Diverter	Minimum	11.1	36.6
	Average	45.3	82.6
	Maximum	62.6	154.8
Velocity of Flue Gases Feet/Minute	Minimum	314.0	224.0
	Average	353.0	324.0
	Maximum	389.0	502.0

*For presentation to subcommittee on Appliance Installation, Pacific Coast Gas Association, at Spring Technical Section Meeting, Los Angeles, May 21-22, 1942.

[1]Pacific Coast Gas Association Proceedings, Volume 23, 1932.

[2]Pacific Coast Gas Association Proceedings, Volume 26, 1935.

A. General information about the installation
   1. Appliance.
      (a) Make, type, and input.
   2. Flue.
      (a) Dimensions—diameters, horizontal and vertical lengths, etc.
      (b) Number and type of fittings.

B. Smoke test for satisfactory venting, following American Gas Association test procedure for detection of spillage at the draft diverter.

C. Temperatures, summer and winter conditions.
   1. Top and bottom of vertical flue.
   2. Inlet and outlet of the draft diverter.
   3. Room and outside air.

D. Flue Gas analyses to determine:
   1. Per cent excess air
      (a) Below draft diverter.
      (b) Above draft diverter.
   2. Per Cent air dilution at the draft diverter.

E. Pressure readings within the flue taken with a pitot tube and micromanometer.
   1. Static pressure.
   2. Velocity pressure.
   3. Total pressure.

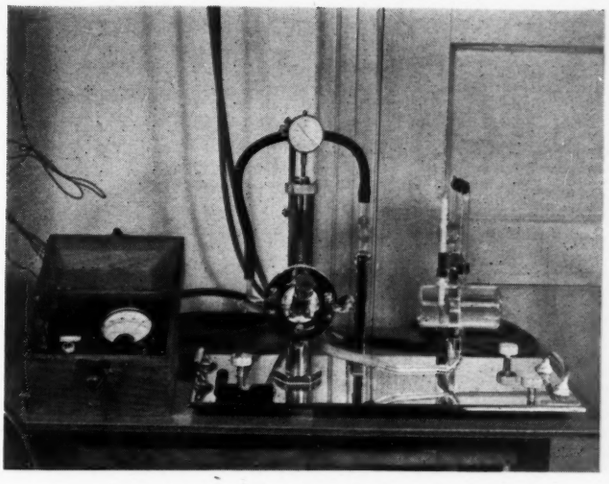
Results of Field Investigations: A total of 16 furnace installations and 21 water heater installations were tested. Seven furnaces and nine water heaters, or 43% of the installations tested, were A.G.A. approved.

Table No. 1 lists the findings obtained from the investigations of furnaces, and Table No. 2 lists the findings obtained from the water heater

▲

FIG. 2

▼



investigations. For the purpose of analysis, both groups are divided into one-story and two-story installations and the water heater tests are further divided into summer conditions and winter conditions. Although the installations which were tested during summer conditions were not retested during winter conditions, it is believed that the results obtained from different installations tested during summer and winter conditions are indicative results, since all were typical field installations.

Table No. 3 compares air dilution, spillage, and average stack temperatures. Table No. 4 shows, briefly summarized, the average conditions under which these appliances were found to be operating.

Discussion of Test Results: Confining attention first to Tables Nos. 1 and 2, it is noticed that all installations are equipped with some type of flue cowl and all two-story installations have an average of two 45° elbows and three 90° elbows. It should be mentioned at this time that tests conducted at the Gas Appliance Laboratory in connection with flue cowls, show that various cowls have a resistance approximately equal to the resistance of 6 to 33 diameters of straight flue (f=0.0083). In the course of these tests, it became evident that, for a given temperature, (1) a change in the quantity of flue gases delivered

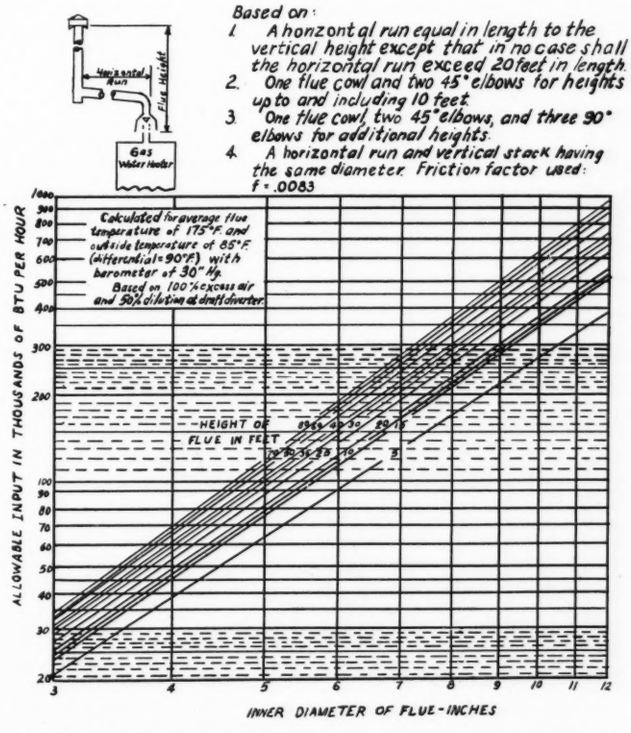

Based on:
1. A horizontal run equal in length to the vertical height except that in no case shall the horizontal run exceed 20 feet in length.
2. One flue cowl and two 45° elbows for heights up to and including 10 feet.
3. One flue cowl, two 45° elbows, and three 90° elbows for additional heights.
4. A horizontal run and vertical stack having the same diameter. Friction factor used: f = .0083
Horizontal Run
Flue Height
Gas Water Heater
Calculated for average flue temperature of 175°F. and outside temperature of 65°F. (differential = 90°F.) with barometer at 30" Hg.
Based on 100% excess air and 50% dilution at draft diverter.
HEIGHT OF FLUE IN FEET
ALLOWABLE INPUT IN THOUSANDS OF BTU PER HOUR
INNER DIAMETER OF FLUE-INCHES

FIG. 3. Allowable B.t.u. input to circular flues for domestic gas water heaters with draft diverters. To be used for metal and terra-cotta lined flues.

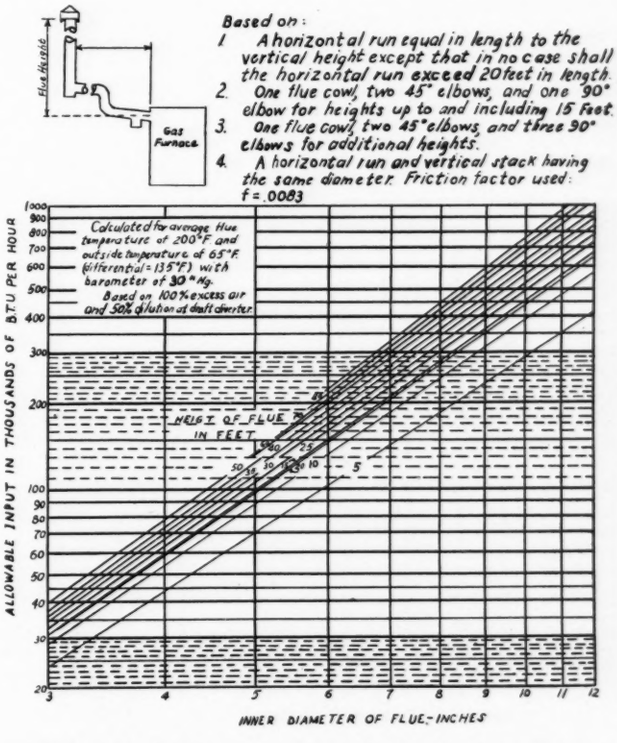

Based on:
1. A horizontal run equal in length to the vertical height except that in no case shall the horizontal run exceed 20 feet in length.
2. One flue cowl, two 45° elbows, and one 90° elbow for heights up to and including 15 Feet.
3. One flue cowl, two 45° elbows, and three 90° elbows for additional heights.
4. A horizontal run and vertical stack having the same diameter. Friction factor used: f = .0083
Flue Height
Gas Furnace
Calculated for average flue temperature of 200°F. and outside temperature of 65°F. (differential = 135°F.) with barometer at 30" Hg.
Based on 100% excess air and 50% dilution at draft diverter.
HEIGHT OF FLUE IN FEET
ALLOWABLE INPUT IN THOUSANDS OF B.T.U. PER HOUR
INNER DIAMETER OF FLUE-INCHES

FIG. 4. Allowable B.t.u. input to circular flues for domestic gas furnaces with draft diverters. To be used for metal and terra-cotta lined flues.

TABLE NO. 2. SUMMARY OF RESULTS OBTAINED FROM FIELD INVESTIGATIONS OF WATER HEATERS

Type of Investigation Number Tested (21)		*Single Story 14*	*Two Story 7*
Flue			
Length, Ft.	Minimum	4.00	18.40
	Average	6.69	26.20
	Maximum	9.63	36.46
Height, Ft.	Minimum	4.00	12.41
	Average	6.31	19.45
	Maximum	9.61	28.30
Diameter, Inches		3 & 4	3, 4. & 5
Fittings	Cowl	1	1
	90° Elbows	0	3
	45° Elbows	2	2

Flue Gas Analysis

		Summer Conditions Number Tested 10	*Winter Conditions Number Tested 4*	*Summer Conditions Number Tested 3*	*Winter* Conditions Number Tested 4*
% Excess Air Below Draft Diverter	Minimum	25.4	35.4	36.2	55.8
	Average	94.4 (89.8 Avg.)	78.4	135.1 (100.8 Avg.)	75.2
	Maximum	182.5	139.2	186.5	89.1
% Air Dilution at Draft Diverter	Minimum	5.8	117.2	71.4	35.0
	Average	61.2	138.9	89.6	255.4
	Maximum	195.5	149.0	124.0	509.0
Velocity of Flue Gases Feet/Minute	Minimum	215.0	198.0	275.0	202.0
	Average	311.0	241.0	346.0	265.0
	Maximum	458.0	273.0	402.0	352.0
Temperature, °F.					
Below Draft Diverter	Minimum	119	310	380	360
	Average	360	367	453	415
	Maximum	645	438	510	530
Average Stack	Minimum	104	159	155	106
	Average	177	205	168	136
	Maximum	260	255	188	205
Room	Minimum	68	69	72	62
	Average	76	73	74	69
	Maximum	93	76	77	73
Outside	Minimum	70	Thirteen	51	Eight
	Average	76	Summer	58	Winter
	Maximum	83	Investigations	65	Investigations

* The majority of the installations which make up this column are vented in multiple with a furnace. Although these are multiple installations they are included in this table because they are also used singly and represent common installation.

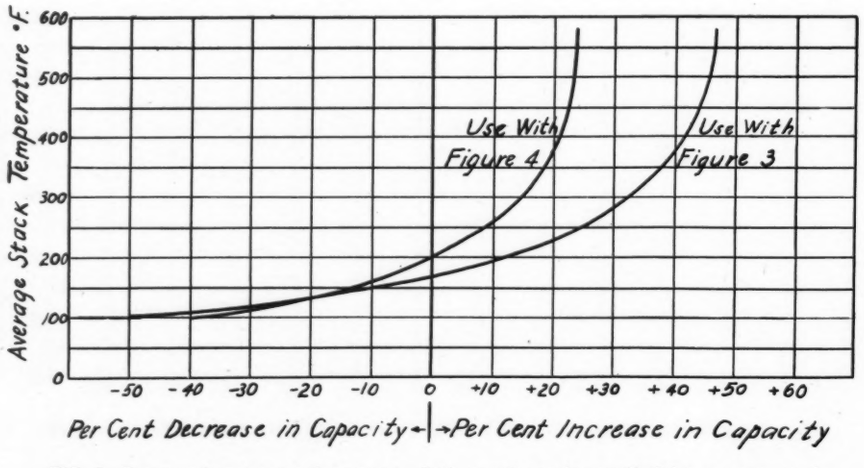


FIG. 5. Per cent increase or decrease in flue capacity to be applied for average stock temperatures other than those used in Figs. 3 and 4.

to the flue is offset by a change in the quantity of dilution air so that the quantity of flue gases (in pounds per hour) above the draft diverter is constant, and (2) a change in gas input to the appliance is offset by a change in the quantity of excess air through the combustion chamber so that the quantity of flue gases below the draft diverter is constant, the difference between the quantity of flue gases above the draft diverter and the quantity of flue gases below the draft diverter apparently being a function of the draft diverter. This fact is also shown in Tables Nos. 1 and 2 where it is noticed that the average per cent excess air below the draft diverter remains unchanged regardless of the height of the stack. These results are desirable when they are considered from the standpoint of draft diverter performance since the draft diverter is used for three purposes, namely:

1. To prevent excessive updrafts in the combustion chamber from wind or chimney action.

2. To prevent smothering of the flame from downdrafts.

3. To prevent pilot outages from updrafts or downdrafts.

Considering Table No. 3, it is noticed that there is apparently a tendency for spillage to occur with air dilutions of less than 50%. Since spillage should theoretically occur only when no dilution air is taken in at the draft diverter, it is indicated that considerable turbulence exists at that point. In flue installations where low temperatures are encountered accompanied by air dilutions greatly in excess of 50%, it is indicated that the appliance is not capable of supplying a large enough volume of combustion products to satisfy the flue capacity, the difference being made up in dilution air. Consequently, a larger appliance should be connected to the flue, or a smaller-sized flue should be provided to avoid condensation resulting from low temperatures.

From Table No. 4 it can be seen that the temperature differential attained in Southern California is quite low due to outside temperature conditions.

Conclusions: In general, it may be concluded from this work that certain factors in the general flow equation should be modified to fit Southern California conditions. This paper, therefore, proposes two capacity tables, one for water heaters and one for furnaces, to be used in areas where conditions are similar to those encountered in Los Angeles. However, it is believed that these tables should also

be applicable in other localities. The average temperature of the flue gases should be approximately the same in all localities depending, of course, upon flue material and construction, and appliance design, since practically all domestic flues are built with the major part of the flue inside of the building, and the dilution air is always at room temperature.

Water heaters are in use during all seasons. Consequently, winter temperatures will provide the greatest temperature differential and a resultant strong draft in the flue. However, this large capacity cannot be utilized because summer temperatures are the most unfavorable for venting. Therefore, Table No. 5, Water Heater Flue Capacities, is calculated for summer conditions and is set up assuming that the flue has one flue cowl and two 45° elbows for heights up to and including 10 ft. For additional heights, it is assumed that the flue has one flue cowl, two 45° elbows and three 90° elbows. The average stack temperature is taken as 175°F. with an outside temperature of 85°F. This same material is shown in graphical form in Fig. 3.

Table No. 6, for furnaces, is set up assuming that the flue has one flue cowl, 90° elbow, and two 45° elbows for heights up to and including 15 ft. For additional heights, it is assumed that the flue has one flue cowl, two 45° elbows, and three 90° elbows. The average stack temperature is taken as 200°F. with an outside temperature of 65°F., the maximum temperature at which heat is usually required. This material is shown in graphical form in Fig 4.

The following assumptions are made for both tables and graphs.

1. 100% excess air through the appliance.
2. 50% air dilution at the draft diverter to prevent spillage and to avoid low stack temperatures.
3. A horizontal run equal in length to the vertical height, except that in no case shall the horizontal run exceed 20 ft. in length.
4. The horizontal run and the vertical stack have the same diameter.
5. Calculations from field data indicate that the resistance of a 45° elbow is approximately one-half the resistance of a 90° elbow. The resistance of each 45° elbow, therefore, has been taken as one-half the value used for a 90° elbow.
6. The resistance of a flue cowl has been taken as being equal to the resistance of 15 diameters of straight flue (f=0.0083). It is believed that this figure is a good average value as indicated by Laboratory tests.
7. In calculating the flue resistance, the length of the vertical stack has been taken as one foot less than the height

TABLE NO. 3

Per Cent Air Dilution at Draft Diverter	*Spillage*	*Average Stack Temperature °F.*	*A. G. A. Approved*
	Water Heaters		
73.4	None	183	No
66.2	None	260	No
6.0	Slight	147	No
63.1	None	258	No
124.0	None	155	Yes
40.0	Slight	184	Yes
53.0	None	157	Yes
195.0	None	215	No
11.2	Considerable	136	Yes
8.5	Considerable	104	No
27.4	Slight	132	No
117.2	None	255	No
*259.5	None	107	Yes
*509.0	None	106	Yes
100.0	None	175	Yes
35.0	None	124	No
129.9	None	159	No
149.0	None	226	Yes
71.4	None	160	No
148.5	None	181	Yes
218.0	None	205	No
	Furnaces		
44.9	None	265	No
53.0	None	356	Yes
45.7	None	274	No
57.5	Slight	186	No
*154.0	Slight for 1st 3-min.	155	No
36.6	Slight for 1st 15-min.	219	Yes
0.0	Considerable	154	No
11.1	Slight	319	Yes
42.8	Slight	222	Yes
54.0	None	300	Yes
123.0	None	244	No
65.1	None	350	Yes
48.8	Slight	158	No
50.4	Considerable	160	No
*56.8	None	169	Yes
56.1	None	200	No

* Multiple Vented Installations.

TABLE NO. 4

Weather Conditions	WATER HEATERS *Summer*		WATER HEATERS *Winter*		FURNACES *Winter*	FURNACES *Winter*
Type of Installation	*One Story*	*Two Story*	*One Story*	*Two Story*	*One Story*	*Two Story*
Temperature Differential, °F.	101.0	92.0	147.0	78.0	247.0	92.0
% Excess Air Below Draft Diverter	94.4	135.1	78.4	75.2	55.9	53.9
% Air Dilution at Draft Diverter	61.2	89.6	138.9	255.4	45.3	82.6

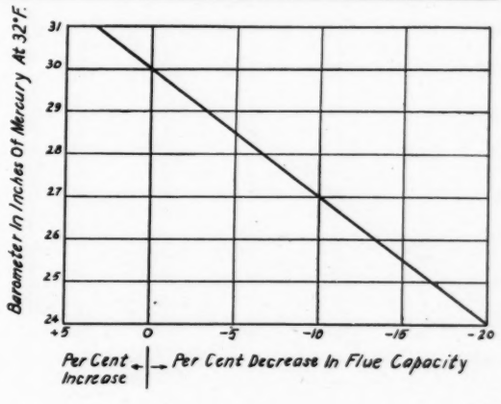


FIG. 6
Effect of barometer on flue capacity.

TABLE NO. 5. CAPACITY OF DOMESTIC VENTS AND FLUES FOR WATER HEATERS IN SOUTHERN CALIFORNIA
B.T.U./HR. APPLIANCE RATED INPUT

Height from Appliance Outlet to Top of Flue in Feet	*Diameter of Vent and Flue in Inches*							
	3	*4*	*5*	*6*	*7*	*8*	*10*	*Remarks*
5	21,100	39,300	63,250	.....	.....	.....	.....	1
10	24,800	47,600	78,100	116,800	163,000	218,000	352,000	1
15	24,200	46,200	75,900	113,100	158,000	212,000	341,000	2
20	25,500	49,400	81,700	123,000	172,500	231,000	377,000	2 or 3
25	27,300	53,100	88,200	133,000	187,500	252,000	412,000	3
30	29,000	56,100	93,800	141,500	200,000	270,000	442,000	3
35	30,100	59,000	98,600	149,500	211,500	285,000	468,000	3
40	31,100	61,250	102,800	152,200	221,000	298,000	491,000	3
50	.....	65,000	109,200	166,500	237,000	321,000	530,000	3
60	.....	.....	114,500	175,000	250,000	338,000	562,000	3
70	.....	.....	.....	182,000	260,000	353,000	588,000	3
80	.....	.....	.....	.....	268,500	366,000	610,000	3

1. $\text{B.t.u./hr.} = 2025\left[\frac{HD^5}{H+2.38D-1}\right]^{\frac{1}{2}}$ 2. $\text{B.t.u./hr.} = 2025\left[\frac{HD^5}{H+3.88D-1}\right]^{\frac{1}{2}}$ 3. $\text{B.t.u./hr.} = 2870\left[\frac{HD^5}{H+7.75D+19}\right]^{\frac{1}{2}}$

Where H = Height of flue above appliance outlet, in feet.
Temperature differential—90°F.

D = Diameter of flue and "horizontal" run, in inches.
Outside air temperature—85°F.

1. One flue cowl, two 45° ells, horizontal length equal to the vertical length.
2. One flue cowl, two 45° ells, three 90° ells, horizontal length equal to the vertical length.
3. One flue cowl, two 45° ells, three 90° ells, horizontal length is 20 feet.

TABLE NO. 6. CAPACITY OF DOMESTIC VENTS AND FLUES FOR FURNACES IN SOUTHERN CALIFORNIA
B.T.U./HR. APPLIANCE RATED INPUT

Height from Appliance Outlet to Top of Flue in Feet	*Diameter of Vent and Flue in Inches*							
	3	*4*	*5*	*6*	*7*	*8*	*10*	*Remarks*
5	23,800	43,600	70,600	.....	.....	.....	.....	1
10	28,500	54,100	88,800	132,500	184,000	243,000	394,000	1
15	30,800	59,600	97,700	148,500	209,000	280,000	456,000	1
20	30,400	58,900	97,000	147,000	207,000	276,500	450,000	2
25	32,700	63,500	102,800	159,000	225,000	302,000	494,000	2
30	34,550	67,400	112,500	170,000	240,500	323,000	530,000	2
35	36,000	70,600	115,200	179,500	254,000	342,000	561,000	2
40	37,300	73,600	120,000	186,800	265,000	358,000	589,000	2
50	39,400	78,000	127,000	193,500	284,500	384,000	635,000	2
60	.....	.....	134,500	205,000	299,000	406,000	674,000	2
70	.....	.....	.....	214,000	312,000	424,000	706,000	2
80	.....	.....	.....	221,000	321,500	440,000	733,000	2

1. $\text{B.t.u./hr.} = 2435\left[\frac{HD^5}{H+2.88D-1}\right]^{\frac{1}{2}}$ 2. $\text{B.t.u./hr.} = 3440\left[\frac{HD^5}{H+7.75D+19}\right]^{\frac{1}{2}}$

Where H = Height of flue above appliance outlet, in feet.
Temperature differential—135°F.

D = Diameter of flue and "horizontal" run, in inches.
Outside air temperature—65°F.

1. One flue cowl, two 45° ells, one 90° ell, horizontal length equal to the vertical length.
2. One flue cowl, two 45° ells, three 90° ells, horizontal length is 20 feet.

TABLE NO. 7. CAPACITY OF DOMESTIC VENTS AND FLUES IN B.T.U. PER HOUR APPLIANCE INPUT HEIGHT FROM APPLIANCE OUTLET TO TOP OF FLUE IS 20 FEET

Source	*Conditions*	*Diameter of Vent and Flue in Inches*						
		3	*4*	*5*	*6*	*7*	*8*	*10*
Mr. Frank Wills P.C.G.A. Proceedings Volume 23, 1932	All Appliances 100% Excess Air 100% Air Dilution 150°—60°F.	20,100	38,900	64,400	96,800	137,000	183,000	295,000
Mr. Frank Wills P.C.G.A. Proceedings Volume 26, 1935	All Appliances 100% Excess Air 25% Air Dilution 200°—60°F.	40,000	80,000	130,000	195,000	280,000	375,000	615,000
Table No. 5	Water Heaters 100% Excess Air 50% Air Dilution 175°—85°F.	25,500	49,400	81,700	123,000	172,500	231,000	377,000
Table No. 6	Furnaces 100% Excess Air 50% Air Dilution 200°—65°F.	30,400	58,900	97,000	147,000	207,000	276,500	450,000

from the appliance outlet to the top of the flue in order to allow for a slope of at least 1/2 in. per ft. of horizontal length.

It is to be noted that Tables No. 5 and 6 together with Figs. 3 and 4 are each set up for one average stack temperature. However, as stack height is increased, the average stack temperature is decreased due to additional dilution air and greater heat losses. The capacity of a flue varies with the temperature according to the value of the expression:

$$\frac{\sqrt{\frac{T_2}{ST_1} - 1}}{T_2}$$

where

T_2=Mean temperature of flue gases in the flue, °F. Absolute

T_1=Temperature of air, °F. Absolute

S=Specific gravity of flue gases at 60°F. and 30 ins. Mercury, Air=1.

Considering S=1, Fig. 5 has been set up showing the relative capacities referred to that at the assumed temperatures in Figs. 3 and 4. Thus, capacities at other than the assumed temperatures may be determined by multiplying by the proper factor.

Fig. 6 shows the effect of various barometric pressures on flue capacities.

Table No. 7 compares the flue capacities from Tables No. 5 and 6 with the flue capacities previously presented by Mr. Wills in order to show how the capacities are affected by changes in the values assumed for the various variables.

Emergency Fire Control and Shut-off Methods

IN CONTROLLING fires from ruptured high pressure mild steel gas mains where the immediate operation of previously installed valves is not feasible, it is generally impossible to use those methods common to the control of gas fires burning from low pressure cast iron mains because of the high pressures involved and the probably mangled condition of the open ends of the ruptured main.

Since most of the high pressure gas in Pacific Coast distribution systems is carried in pipe made of mild steel, the ductility of which is high, it was thought that by pinching the pipe walls together with a suitable device, control of the gas flow could be achieved. This means of control was investigated both by tests performed in the laboratory and in actual field tests using a portable pipe pinching apparatus.

The apparatus used (Figs. 1 and 2) was designed to handle pipe sizes up to and including 6 in. in diameter and consisted of:

1. A hydraulic ram (Black Hawk Manufacturing Co., Milwaukee, Wisc., Model R-210); approximate weight, 60 lbs.; rated capacity, 50 tons;
2. A hydraulic pump (Black Hawk Model P-85); approximate weight, 35 lbs., rated capacity, 10,000 lbs. per sq. in.;
3. A frame made of 5-in. channel iron; weight, 83 lbs., and
4. Two removable shear plates; total wt., 35 lbs.

This apparatus can be assembled on a pre-exposed pipe by a trained crew in approximately two minutes, and the pipe pinched in a time interval the length of which in minutes is approximately equal numerically to one-half the diameter of the pipe.

Even though the pinching apparatus does not completely close the pipe, the resulting flow through the restricted cross section can be easily controlled even at pressures as high as 35 lbs. per sq. in. However, when the pressure exerted by the hydraulic ram in the pinching apparatus is released, the pipe has a tendency to spring apart slight-

THE DATA presented herewith consists of excerpts from a report of the subcommittee on Special Problems, Distribution Committee, Technical Section, Pacific Coast Gas Association. The report entitled, "Fighting Fires in Distribution Mains and Structures," was presented at the May meeting of the Technical Section, the discussion being led by C. F. Briscoe, Southern Counties Gas Co. and W. M. Henderson, Southern California Gas Co., Los Angeles.

FIG. 1
Hydraulic ram and and pipe frame.

ly, thus increasing somewhat the amount of gas passing through the pinched portion. Experiments are now in progress involving the modification of the design of the shear plates to allow them to be left on the pinched pipe to act as clamps holding the collapsed pipe together. It would then be possible to remove the ram and frame immediately for use elsewhere. A complete shut-off of gas flow can be obtained with the pipe pinching apparatus by heating the pipe to a red heat close to the point of pinch during the pinching operation. The application of heat caused the pipe walls to yield sufficiently to allow them to be completely collapsed. After the pipe walls have cooled, the pinching apparatus can be removed and used for further work at other locations.

In considering the pinching procedure, questions naturally arise as to:

1. The force necessary to collapse various diameters of fixed-end pipe.

2. The probability of rupturing the pipe or breaking a weld in the pipe due to the axial tensile stresses developed during the pinching operation.

3. The length of pipe so damaged that it must be replaced when permanent repairs are to be made.

To answer these questions tests were conducted in the laboratory, and checked by field tests which were made under conditions similar to those that may be encountered in an actual emergency. These latter tests were made on abandoned mains which had been in the soil a number of years and had become firmly embedded in it.

Laboratory tests showed that the force, as applied by the pinching device, necessary to collapse free-end mild steel pipe up to 6 in. in diameter was fairly constant (see Fig. 3). The data obtained for the force required to pinch free-end pipe as tested in the laboratory and to pinch fixed end pipe in the field agree for the 4-in. pipe but not for the 6-in., The greater force required for 6-in. pipe in the field may have been due to a greater thickness or less ductility of pipe wall in the field-tested pipe than in the laboratory-tested pipe. However, it also would be expected that a greater force would be required to pinch fixed-end pipe than free-end pipe.

It was found in the field tests that the axial strain (back from the deformed portion of the pipe) developed during the pinching operation increased with the diameter of the pipe. The maximum axial stress encountered during these tests, as calculated from the maximum axial strain measured in the larger diameter pipe (6-in.), did not exceed 28,000 lbs. per sq. in. Therefore, it is reasonable to believe that rupturing the pipe due to axial stresses set up during pinching is unlikely in view of the fact that the average ultimate strength of most of the mild steel pipe used is 60,000 lbs. per sq. in. Studies conducted have

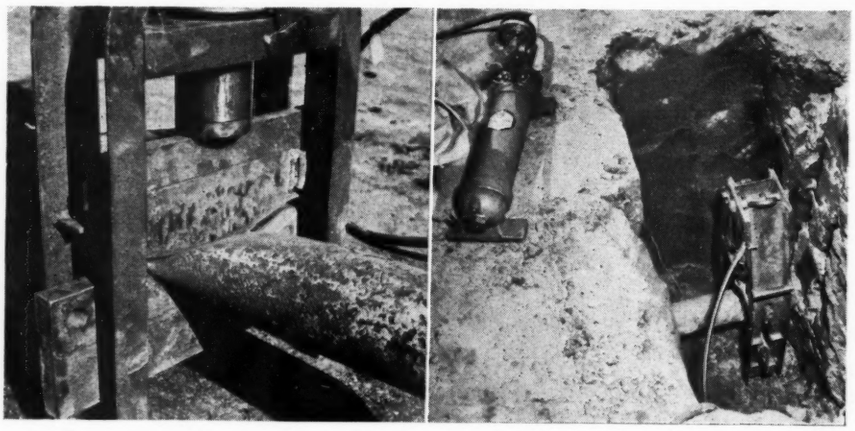


FIG. 2. (Left) Close-up of pipe pinching device. (Right) Pipe pinching device in place on main.

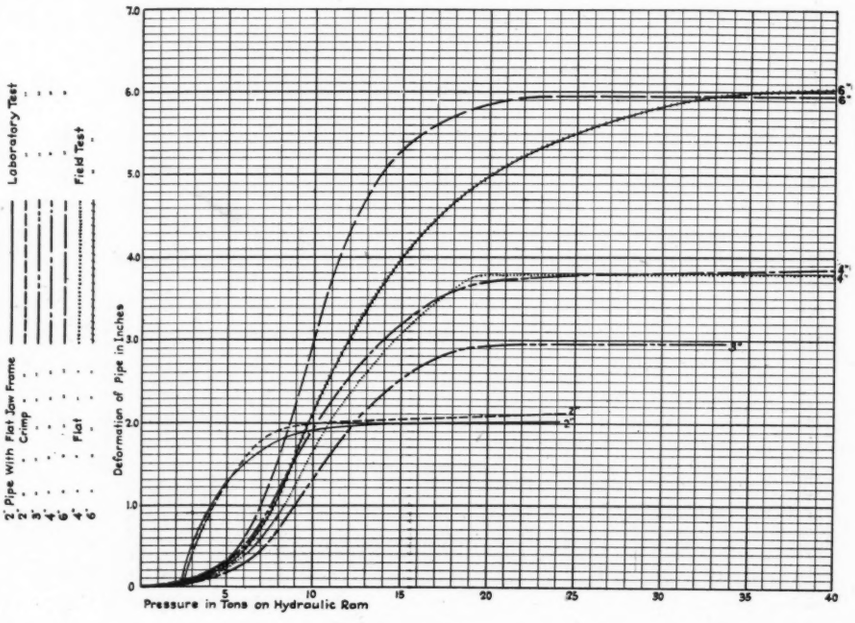


FIG. 3. Load on ram vs. deformation of pipe.

shown that the tensile strength of the majority of good welds in mild steel pipe made in the practice of 20 years ago exceeds 48,000 lbs. per sq. in. and that, while inferior welds may be found, the ultimate strength of these usually exceeds 30,000 lbs. per sq. in. Since it is generally accepted that welding technique has improved in recent years, it is reasonable to assume that the great majority of welds now in service will exceed this minimum. Therefore, it is believed that on pinching pipe, no rupturing of welds back from the pinched section is likely to take place in pipe up to 6 in. in diameter.

The amount of permanently deformed pipe section resulting from pinching varies with the diameter of the pipe. The tests performed indicated that for 2-in. pipe approximately 8 in. on either side of the point of pinch is deformed, for 4-in. pipe approximately 20 in., and for 6-in. pipe approximately 26 in. On either side of the deformed section the residual axial strain existing after pinching is relieved by cutting out the pinched section, and as the pipe on either side of this section has never passed its yield point, it should be as serviceable as before the pinching operation.

While it appears that the pipe-pinching apparatus is not always necessary to shut off low pressure gas main fires and certainly could not be used on cast iron mains, it is believed that a mechanical device such as described has merit in that it does provide a relatively cheap, portable, rapid, and, with some modification of design, positive shut-off of gas flow from ruptured high pressure gas mains, leaving the main in such condition that it can be conveniently repaired with a minimum of expense.

The foregoing discussion has dealt largely with shut-off methods. There are likely to be cases, however, where the extinguishing of fires is of first importance.

■ ■

Fire Extinguishment With an Inert Gas

EXTINGUISHING of a gas fire burning at the open end of a ruptured main may in some instances be necessary when shutting off the gas flow is not feasible. The use of an inert gas injected into the combustible gas stream to dilute it to the point where it is non-combustible is one means of extinguishment which has been investigated. From data previously developed it can be calculated that for noncombustibility the ratio

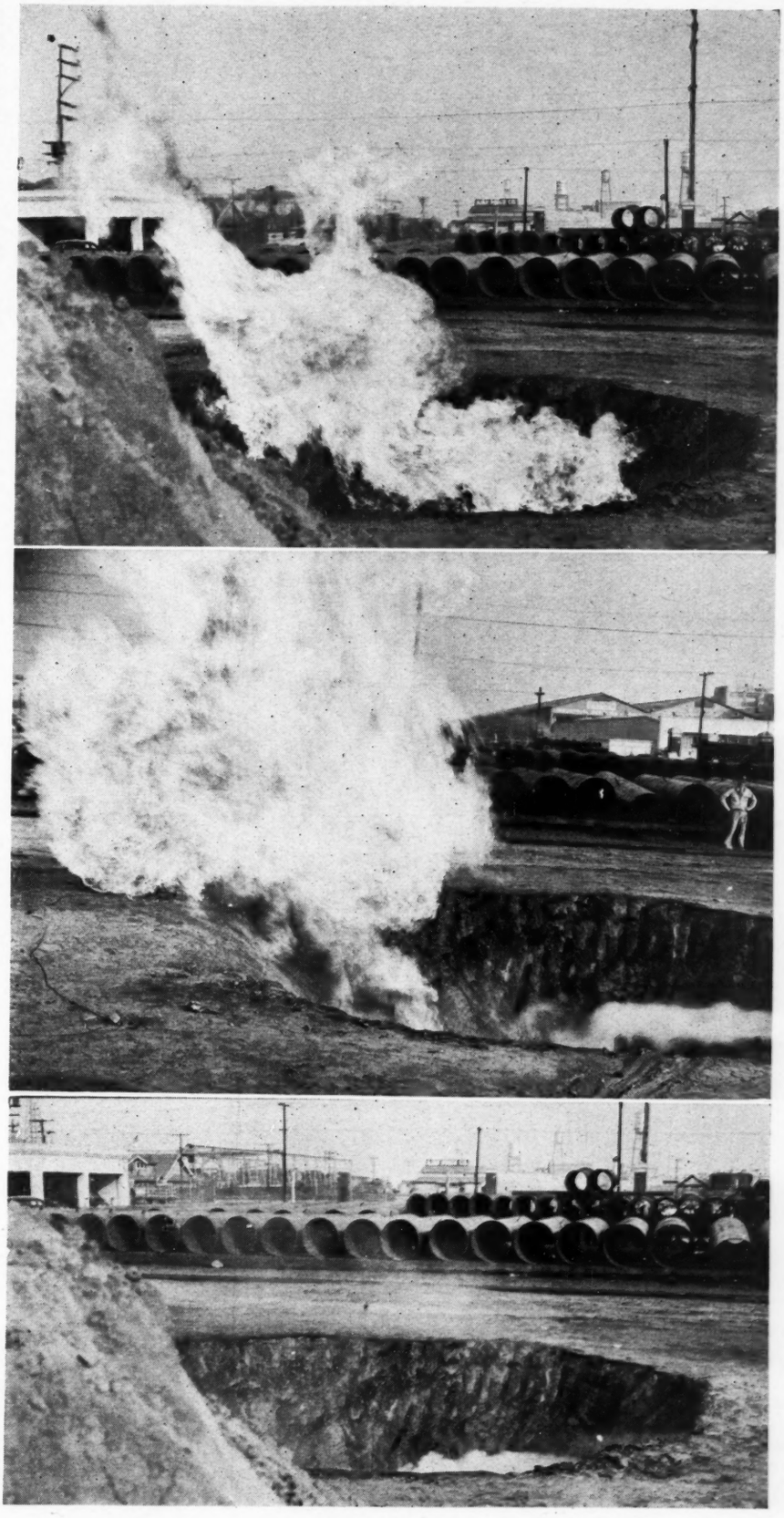


FIG. 4

(Top) Gas escaping at low pressure from 12-in. pipe. Rate—100 M c. f. per hr. (Center) Liquid CO_2 issues from end of 12-in. pipe purges burning gas. (Bottom) Fire completely extinguished by CO_2.

TABLE NO. 1.

Test No.	Inert Gas Used	Pipe Diameter Ins.	Flow, MCF/hr. Nat.	Flow, MCF/hr. Inert	Ratio of Flow Rates Inert Gas to Nat. Gas	Nat. Gas Velocity in Main ft/min(1)	Inert Gas Velocity in Main ft/min(1)	Vol. of Inert Gas C.F.	Point of Injection into Main to Flame ft.	Point of Injection	Type of Valve in Inert Gas Cyl.	Time to Put Out Flame: Secs.
1	N_2	6	25.4	69.3	2.7	2,150	5,860	95	40	At Main	Standard	5
2	N_2	6	22.0	19.3	0.88	1,860	1,630	134	40	"	"	*
3	N_2	6	22.0	42.3 (2)	1.9	1,860	3,580	200	40	"	"	*
4	N_2	6	21.9	52.7	2.4	1,858	4,470	117	40	"	"	8
5	N_2	6	22.7	42.2	1.9	1,930	3,580	105	40	"	"	*
6	CO_2	6	22.6	222.0	9.8	1,915	18,800	123	40	"	¾" Nord.	2
7	"	6	72.0	222.0	3.1	6,100	18,800	123	40	"	"	2
8	"	6	22.0	222.0	10	1,860	18,800	123	40	42'1" Ser.	"	2
9	"	6	72.0	222.0	3.1	6,100	18,800	123	40	"	"	2
10	"	6	22.0	12.5	0.57	1,860	1,060	...	40	"	Standard	*
11	"	12	11.6	222.0	20	246	4,700	188	40	"	¾" Nord.	3-4
12	"	12	73.0	222.0	3.0	540	4,700	145	40	"	"	2-3
13	"	12	30.0	222.0	7.4	634	4,700	184	40	"	"	2
14	"	12	30.2	222.0	7.4	634	4,700	43	40	"	"	1
15	"	6NS(3)	20.0	222.0	11	1,690	18,800	132	34	41'1" Ser.	"	2
	"	6SS(3)	20.0	222.0	11	1,690	18,800	64	40	42'1" Ser.	"	2
16	"	6NS	7.0	222.0	32	591	18,800	132	34	41'1" Ser.	"	2
	"	6SS	68.0	222.0	3.3	5,830	18,800	64	40	42'1" Ser.	"	2
17	"	12NS	7.0	222.0	32	148	4,700	162	34	41'1" Ser.	"	2
	"	12SS	71.6	222.0	3.1	1,510	4,700	128	40	42'1" Ser.	"	*(4)
18	"	12NS	32.5	222.0	6.8	687	4,700	137	34	41'1" Ser.	"	2
	"	12SS	32.5	222.0	6.8	687	4,700	137	40	42'1" Ser.	"	2
19	"	12NS	7.0	222.0	32	148	4,700	132	34	41'1" Ser.	"	2
	"	12SS	69.5	222.0	3.2	1,470	4,700	132	40	42'1" Ser.	"	*(4)
20	"	12	33.5	222.0	6.6	707	4,700	...	2	50'¾" pipe (5)	"	1
21	"	12	65.2	222.0	3.3	1,380	4,700	...	2	"	"	1

(1) Calculated on basis of pressure of one atmosphere in main. Actually, there was a pressure gradient in the pipe; therefore, velocities given are maximum.
(2) These values are only an average; the rate at first would be very high and would drop off considerably as the cylinder pressure dropped.
(3) Northside and southside of crater. Inert gas was injected into mains feeding both sides simultaneously.
(4) The injection time was two seconds; the flame was nearly extinguished and it is very likely that for an injection time of from 3/4 seconds, the flame would have been put out.
(5) Injection pipe was inserted into open end of main.

* — Did not extinguish flame.

of carbon dioxide to methane and nitrogen to methane are 2.9 to 1 and 5.3 to 1 respectively. These values would presumably be slightly higher for a combustible gas of 15% ethane and 85% methane (approximate composition of the gas served by the Companies represented on the committee), since ethane will burn in the presence of more inert gas than will methane,

To extinguish a gas fire burning at the open end of a main passing 75 M c. f. per hr. would require the injection of carbon dioxide at 2.9 times this rate, or 218 M c. f. per hr. of carbon dioxide. The example shows that any carbon dioxide injection equipment will have to have considerable delivery capacity.

In practice the injection of an inert gas into a main may be made through a service pipe or, where possible, through a small pipe introduced into the open end of the main. If the point of injection should be a considerable distance from the open end of the main, it is quite probable that only the amount of inert gas that would be needed to form a slug of noncombustible gas of relatively short length would be required. The slug thus formed would flow to the open end of the main with very little change in composition.

At the site of the experimental crater which is some 20 ft. in diameter and 10 ft. deep with the open ends of various sized pipes projecting into it, tests were made to determine the actual quantities and flow rates of inert gases required to extinguish gas fires. The pictures (Fig. 4) show the actual extinguishing of a fire by this means. Carbon dioxide, which is available in cylinders in the liquid form, was injected into the mains as a liquid, since evaporation in the container would be too slow to give the high flow rates necessary. Nitrogen was injected as a gas from 200 cu. ft. size high pressure cylinders (2,000 lb. per sq. in.). By using carbon dioxide in the liquid form, twice as much carbon dioxide as nitrogen can

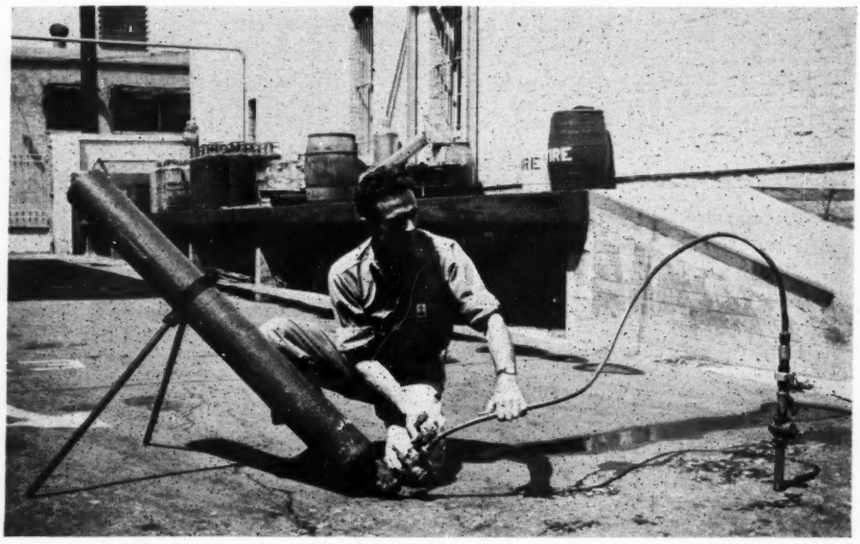


FIG. 5. Portable CO_2 injection unit.

be obtained from a cylinder of given size.

The injection of carbon dioxide was made from a large size cylinder (contents, 50 lb.). The standard valve on the cylinder, which offered too much resistance to the flow of liquid, was replaced with a 3/4-in. high pressure plug cock (1000 lb. test). In making an injection the cylinder was inverted. Injection of nitrogen was made from six cylinders connected to a common manifold. The manifold was made of extra heavy 1/2-in. pipe and was fitted with a high pressure 1/2-in. needle valve. With six cylinders opened to the manifold at one time, high flow rates could be obtained.

In the Table No. 1 are given the results obtained. It was possible to analyze the results for nitrogen because the flow rate at the beginning of the injection period dropped off rapidly as the pressure in the cylinders decreased. Due to the difficulty in controlling the flow rate of carbon dioxide and because it was not possible to get higher flow rates of natural gas, the actual ratio of the carbon dioxide rate to the natural gas rate required for extinguishment could not be determined accurately. However, keeping in mind that the flow rate of carbon dioxide is only a rough approximation, it is likely that the ratio 3 to 1 is critical, since in test No. 12 at a ratio of 3.0 to 1 extinguishment was obtained, and in test No. 17 at a ratio of 3.1 to 1 it was not. This value is in close agreement with the calculated value of 2.9 previously given for methane and carbon dioxide.

For use in extinguishing gas main fires with carbon dioxide gas one type of field injection apparatus consists of a squat carbon dioxide cylinder (same diameter as large cylinder but about half the height). The valve in this cylinder should be replaced with a 3/4-in. pressure plug valve. A 3/4-in. I. D. tube, long enough to nearly reach the bottom of the cylinder, should be welded to the nipple connecting the valve to the cylinder in order that liquid carbon dioxide can be drawn from the cylinder in an upright position. Connection from the valve to main or injection pipe should be made by means of a 3/4-in. I. D. high pressure rubber coupling. A cylinder of the above size will provide about 134 cu. ft. of gas or enough to extinguish from one to three fires.

Another type of apparatus for this purpose is shown in Fig. 5. The cylinder, of a type which is now obsolete, is approximately 5 in. in diameter and 4 ft. long. It is understood that a considerable number of cylinders of this size are still available on the market. Supporting legs which fold against the cylinder, when not in use, hold it in an inverted position at an angle during operation.

On using an inert gas for extinguishing a gas fire burning from an open main at both sides of a crater, it is necessary to inject the gas into both sections of the main simultaneously to prevent re-ignition. Also, experience has demonstrated that where the crater walls are very hot from long burning of the gas, they will cause re-ignition of the gas after extinguishment. In such a case, it would be well to cool the walls of the crater with water before extinguishing the fire.

The foregoing discussion of fire extinguishing would not be complete without the admonition that work should be done under such circumstances that the escaping gas after extinguishment will dissipate into the atmosphere and not into a confined area where an inflammable mixture might form.

A Controlled Order Dispatching Program

By F. W. WINFIELD

Chief Order Dispatcher, Southern California Gas Co., Los Angeles

In 1937 two major utilities, the Los Angeles Gas and Electric Corp. and the Southern California Gas Co. combined, taking the name of the latter. The two companies, although having similar objectives, had numerous differences in operating policies. The need of new operating policies in customer service work caused a review of the entire field of order reception, dispatching, and completion. The procedures of various utilities throughout the country were studied, many at first hand. Finally, in 1939, an integrated plan for the handling of customer orders was adopted. The basic policy of the plan was that uniformly good service be given the customer regardless of the work load.

This was in direct contrast to previous company practice. Common dispatch procedure had been the phoning or mailing of all orders to the field, regardless of whether they could be done that day. At times of peak load servicemen might carry work enough for a full week—but to all appearances the situation was well in hand because there would be no orders actually in the dispatch office.

The stock answer to customer requests for specific appointments for service was "as soon as possible," which might mean any time from the same day to a week later. Quality of the work done by the servicemen naturally suffered as the work load increased. It can, therefore, be seen that the new policy of uniformly good quality of service and promptness of service represented a radical departure from past practice.

The new policy essentially changed operating thinking from one of customer service dependent on operating convenience to one of service at the customer's convenience. Basically, this meant that the same amount of work should be done and the same time spent on an order in winter as in the summer. Despite this, orders were to be executed with the same promptness winter or summer.

To clarify and emphasize the policy, instructions for the completion of each type of order were written and included in Distribution Department Operating Instructions of which each serviceman and dispatcher was provided a copy. The job instructions outlined detailed procedures to be followed on different types of orders. These procedures could be deviated from, but only when the serviceman had good reason to do so. In such cases the deviation and the reason for it were to be noted by the serviceman on his order.

FIG. 1. Here in the order receiving room of Southern California Gas Co.'s telephone service bureau 60 girls daily await the customer's call. During one peak day over 8600 calls were handled; daily average, 2700.

The fact that a serviceman had too many orders on hand was not to be considered as a reason for deviating from job instructions. In such cases it was planned that the serviceman should phone back surplus orders to the dispatch desk or work overtime to complete them.

An Order Completion Schedule was also prepared and included in Distribution Department Operating Instructions. This stated the company's commitment to its customers in the handling of requests for service. "Soon as Possible" was out. Instead, time limits were set up for each type of order. Thus the order receiver was able to promise the customer service for any time with assurance that the appointment would be kept by a serviceman.

The Order Completion Schedule divided the various types of orders into seven classes according to degree of urgency. For example "Hazardous Leaks," "Asphyxiations," "Fires and Explosions" were classed as Schedule "A" orders and called for immediate dispatch and execution whenever received. "No Gas," "Meter Off in Error" and "Overheated Water Heater" were Schedule "B" orders which must be dispatched within an hour after receipt and called on within an hour after being dispatched. Similarly Schedule "C" orders, "Relight Pilot," "No Refrigeration," "Poor Pressure," and so forth were to be dispatched within two hours after receipt and called on within two hours after being dispatched. Schedule "D" orders must be called on within the next day after receipt, Schedule "E" orders within two days after receipt, and Schedule "F" orders within five days after receipt. Schedule "G" orders—company orders, such as Periodic Meter Changes, were to be called on at company convenience.

To meet such an order completion schedule meant that the operating force must be augmented to handle the peak period. Previous practice had been to run along shorthanded during the heavy periods and allow the work to "slop over" into the lighter periods. This was no longer possible so it was necessary to do considerable long range planning to be able to handle the peak loads in stride.

The preliminary measures were the forecasting by the Standards Department of anticipated orders by month for the next several months and the evaluation of these orders in man hours. The forecast was made from estimates based on the historical pattern for completed orders of previous years. The evaluation of different types of orders in the time required for their execution was made from time studies in the central, northern, and southern divisions. Standards department men, all of whom were ex-servicemen, rode with the servicemen in the field and timed their various operations during the day's work.

The study was comprehensive, all parts of the territory being covered so that a cross section of all operating conditions could be taken. Through the time studies order, evaluations were made for each of the various types of orders for each district. Then by applying the order evaluations to the monthly forecast of orders it was possible to estimate the man hours necessary for completion of the orders forecast for individual months. Similarly it was possible to forecast from day to day the number of men necessary for the next day's work.

The company was now able to take stock of its manpower requirements against its manpower available and the operating force increased to its proper level.

The program was then put into operation late in 1939, with centralized order receiving and centralized dispatching. Order receiving was largely divorced from the dispatch offices, which had handled most of it in the past. Central telephone service bureaus were set up under the jurisdiction of the customers' department. All telephone requests for service received during work hours were taken through these bureaus. Orders for the same day were then transmitted to the central dispatch board by means of teletypes. It was found that the use of women for order receiving was much more effective than that of men.

Dispatching also was centralized, one dispatch office for the central division of the company (approximately 600,000 meters) taking the place of four previous dispatch offices. Through centralized dispatching a much closer control of the work load and man power was maintained. Centralization also made it possible to set up a suitable staff to handle clerical work. Previously, clerical work had been handled by the order dispatcher, in addition to his regular duties.

With the establishment of a centralized dispatch office, it was possible for the order dispatcher to concern himself entirely with the "phoning out of orders to the servicemen. The dispatcher exercised no supervision. Any questions from the servicemen requiring instructions or interpretation of orders was referred to the dispatch office supervisor or the servicemen's supervisor. Dispatch office records and clerical work improved materially in quality when the work was transferred from dispatchers to regular clerks.

Under the old dispatch system, "routes" had been prepared for the servicemen largely through dividing the orders into equal "batches" and distributing them to the men. Each serviceman ordinarily had sufficient work to carry him through the day. During the peak periods, of course, he would carry more orders. In addition to the orders that the serviceman took with him to the field, he received other orders over the 'phone. Each serviceman 'phoned the dispatch office twice daily to receive orders. At noon, servicemen regularly met at predetermined locations in the districts to receive additional orders over the 'phone and by messenger. These orders the service-

men divided among themselves as they saw fit.

Under this plan there was very little control over the orders. The execution of turn-on orders and leak orders ordinarily could be depended upon, but the completion of other types of orders could not be predicted.

The new plan for the handling of orders called for the use of 'phone routes and non-'phone routes. A 'phone route man received the bulk of his work by telephone, calling the dispatch office at predetermined times during the day. The call times were planned carefully so as to synchronize with each other and to prevent "bunching up." Each dispatcher was to receive a call every four and one-half minutes.

The 'phone routeman was started in the morning with only sufficient orders to carry him until the load of customer requests was built up. This usually occurred about 10:00 a.m. Day to day planning had to be done to estimate the number of orders that would be received for the same day, and the necessary number of servicemen that would be required for 'phone routes.

Non-'phone routes consisted of an entire day's work, the routeman not telephoning in during the day for additional orders. It was possible, therefore, to predict that the non'phone routeman would complete all orders futured for execution on that day. If the routeman found that he was unable to complete the orders, he was instructed to 'phone in to the dispatch office. In this case, the orders usually were taken from him and dispatched to a 'phone routeman. The 'phone routeman, of course, was not given more orders than he could normally execute.

If at any time during the day an unusual peak of orders was received for execution on the same day, which made it impossible for the 'phone routeman to execute them, additional men were called out to help in the handling of the load. Through these methods it was possible for the order receiver to make definite appointments with the customers on all orders, with reasonable assurance that the appointment would be kept.

As the dispatch system developed, it was found that it was difficult to estimate the number of servicemen required for the following day, unless definite forecasts were made of the orders to be received. Consequently, an hourly count was maintained of each of the various types of orders on hand in the dispatch office for the same day and for each of the following days. In addition, similar counts were received from the various branch offices and telephone service bureaus.

From past records a forecast was set up whereby the number of orders to be received the next day for completion the same day was estimated. This made it possible to determine the number of men needed, on the evening previous. If the manpower requirement was over that of the manpower normally available for the next day, servicemen were called out for the following day before the end of the current working day. This eliminated a former, undesirable practice of attempting to obtain men early in the morning.

In the preparation of the work non-'phone routes, which consist of a full day's work, it was difficult from the available records to determine just what was a day's work. At first, orders were taken at face value. Little thought was given to C.G.I.'s (customer not at home), cancellations, duplicates, and so on. This of course resulted in the orders being over-evaluated, and it was found necessary that more orders be given to the routes to compensate for the percentage of uncompleted orders.

The exact amount of orders to be dispatched to the work routes, of course, is something that can be approached, but never attained. Fluctuations in the percentage of orders uncompleted because no one was home, and so on, make this impossible. In addition, the human element also must be considered, no two men working exactly alike. However, through continual refinement of dispatch methods, it was possible to lessen considerably the margin between the orders dispatched and those not reached in the normal working period.

Use of the technique of 'phone and non-'phone routes took the pressure off the servicemen, with a resultant improvement in the quality of the work done. This, in turn, undoubtedly lessened the number of repeat orders and greatly improved customer acceptance.

The adoption of the new system of preparing routes made it more or less of an exact science, each serviceman being given a definite amount of work expressed in work assignment credits. These work assignment credits were obtained from the order evaluations derived from the time studies. To the time taken for the order itself was added driving time and office time necessary for the job. The total of this time was then reduced to a more workable figure for dispatch purposes.

For example, a turn-on order for the west district might be counted as 4.3

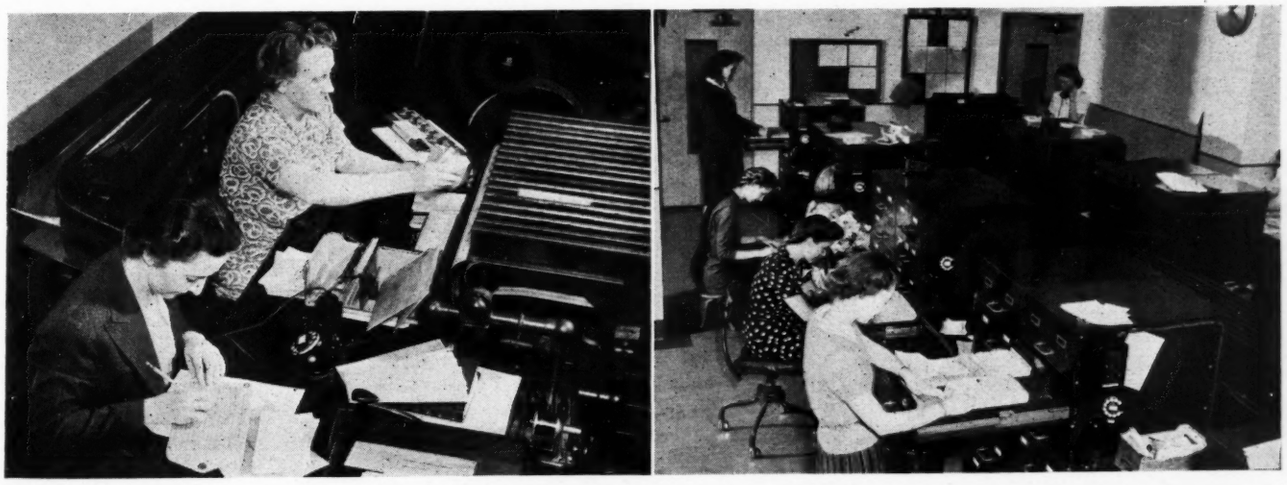


FIG. 2. (Left) The orders are sorted at this desk traveling on endless belts to the file clerks (right) where copies are held for ready reference by customer and service man.

FIG. 3. At the sorting desk in the dispatcher's office, the orders are sent to dispatchers (right), who telephone the orders to the service men in the field.

work assignment credits, a turn-off order, 1.8 work assignment credits, and so on. A work route would then consist of, say, 6 work assignment credits; a 'phone route would be given, say, 15 work assignment credits with which to start the day. All totals of orders received, for operating purposes, were translated into work assignment credits. Scientific preparation of the routes required considerable office time, but paid dividends in making definite the execution of futured orders.

Coincidental with the attention given the dispatching of orders was an increase in the attention given completed orders. Under the old system dispatch office handling of completed orders was limited to counting and mailing them. Glaring errors in order procedure were caught and returned to the serviceman who had committed them. Under the new system, which stressed quality of field work, a similar stress was placed on the quality of the serviceman's written work. Orders were therefore scrutinized minutely after completion and returned to the serviceman whenever the order was incomplete or inaccurate in its information. A marked improvement in the quality of the written work resulted.

To further streamline dispatch procedure, the I.B.M. system of counting and recording orders was adopted. A card was punched on each order, bearing information which could be recorded for use by supervision and by other departments. This eliminated all manual counting of completed and uncompleted orders. It eliminated as well the necessity for preparing an appliance load survey form which had been made by the serviceman on all orders on which he entered the customer's premises. The sales survey information was now entered directly on the serviceman's order and transferred directly to an I.B.M. card. The I.B.M. equipment brought to the dispatch office a refinement in the records that had previously been unattainable.

Centralized dispatching, of course, entailed continuous work planning. The development of routines for proper planning was not an overnight affair, but was rather a gradual, building process. Difficulties of various kinds had to be met and overcome. One typical case was the handling of periodic meter changes. The meter change program was geared to fit the operations of the meter shop, which functioned on a year-round basis with a steady complement of manpower. It was, therefore, necessary to have an even flow of meters into the meter shop at all times. This, of course, was done with considerable inconvenience to the customer service operating force during the peak winter months.

The problem was solved through the curtailment of the operations of the meter shop during four months of the year, with temporary transfer of most of its personnel to other departments. This reduced the number of meters that had to be changed during the winter months to a minimum, and also provided much-needed work for the lighter spring and summer months.

Other problems in the organization and handling of the work to be done were continually arising and had to be solved for smooth operation of the work program. One of the greatest handicaps to efficient operation of centralized order receiving and dispatching was the poor facilities for the work, the quarters and equipment available being inadequate. This situation was relieved in July, 1941, through quarters and equipment made available in a new building.

The telephone service bureau office and the dispatch office now have operating facilities probably unexcelled anywhere in the nation. The dispatch office and the telephone service bureau are situated in adjoining rooms. All customer calls go directly into the telephone service bureau with no intervening switchboard operator. Enabling the customer to tell his story to the first person with whom he comes in contact, is of definite value.

Orders taken by the order receiver are placed on a conveyor belt which, in turn, drops the order into another conveyor belt leading to a sorting desk. Here the duplicate copies of the orders are detached and sent to the files. The original, or work orders, are placed on another conveyor belt which carries the orders into the dispatch office. There the orders are broken down according to the day for which service is requested, and a count is kept for the individual day, by type of order. Orders for the same day are placed on individual conveyor belts leading to the district dispatchers. The net result is that it is possible to 'phone an order to the field within two to three minutes after the customer first contacts the order receiver.

The dispatchers and order receivers are aided materially by means of a three way conversation telephone equipment. It is possible to transfer a serviceman or customer to a third party without losing the call. In addition, each order receiving and dispatch position is equipped with a two way jack which permits the plugging in of another head set. This is valuable for training purposes. The positions are also equipped for monitoring purposes, which is a considerable

aid in the supervision and training of dispatchers and order receivers. Other aids to efficient operation are the direct contact between order reception and order dispatching and the free access to both the order receivers and dispatchers to the order files.

New quarters and equipment for order receiving and dispatching made an immediate improvement in the handling of the orders, eliminating former bottle necks. This was really proven with the first cold day and its consequent heavy influx of orders.. Service requests at this time literally poured in, a total 11,438 orders being received compared to an average number of orders received daily of 3,300. Of the orders received, 4,281 were taken and dispatched for the same day, a total of 14,742 work assignment credits.

The flexibility of the dispatch system is shown by its operation on this peak day. The forecast had called for the receiving of 7,000 work assignment credits, or about 2,000 orders to be executed the same day. However, through calling out all additional available men and by working all men about two hours overtime, the load was handled without any material drop in the quality of work done.

In previous years on this first cold day with its consequent peak load of service requests, the telephone system had never been adequate to handle customer calls. The greatly increased number of customer calls received, of course, placed an unprecedented load on the dispatch system. As a result of the close coordination between order receiving and order dispatching this once a year peak load was handled much better than ever before, with an improvement in customer relations. Such peak days, of course, occur only rarely, but the capacity to handle such days is invaluable.

With the coming of the war, customer service operations, of course, had to be modified. In the Southern California Gas Co. these modifications to date have resulted in curtailment in the schedule of service, rather than in the scope of service. The order completion schedule was revised to allow the operating force a greater latitude and make possible a more efficient routing of orders.

This is, of course, a major topic in itself. Suffice it to say, a very considerable saving in mileage is being made. The adoption of this schedule reduced the per cent of orders to be phoned out for the same day very materially. Previous to the war, about 45% of all of the orders, expressed in work assignment credits, or man hours, were taken for the same day. This has now been reduced to about 8% on week days and 25% on Saturdays. This change forced a variation in dispatch office procedures. The 'phoning of orders to the field became of much less importance as the bulk of the work formerly 'phoned out was now transferred to work routes. Conversely, the additional preparation of work routes was of greater importance.

Various techniques are being tried in the preparation of work routes, and efficiency is steadily being improved. With the improvement came a steady drop in mileage per order. What the war will necessitate in further modification of service policies is impossible to predict. The order dispatching system of the Southern California Gas Company is, however, ready to swing with the punch.

SALES AND ADVERTISING SECTION

Statement of the General Chairman

By J. E. KERN

General Chairman, Sales and Advertising Section, Pacific Coast Gas Association

IN programming the 1942 activities of the Sales and Advertising Section, I have endeavored to periodically bring interested sales and advertising executives all available information and data pertinent to the administration of gas appliance sales, as well as information relative to current federal limiting orders and their resultant problems.

The "streamlined" Executive Sales Conference of this Section, held early in June at the Ambassador Hotel in Los Angeles, was particularly fruitful in its presentation of informative, practical solutions to many current Western Gas Industry operating problems. Informal discussion groups treated with a variety of sales and advertising topics, with an exceptional amount of interest taken in a Southern California Gas Co. "Check-chart" water heater service program, a clever gas appliance service promotional plan of the Pacific Gas & Electric Co., and the many problems of post-war planning. Several of the Commercial and Industrial Sales topics revealed clever and ingenious methods of handling new industrial gas applications. Of special interest was a plan presented by the San Diego Gas & Electric Co. for removing excess protective coatings from aircraft engines, using natural gas as a fuel; also a plan of the Pacific Gas & Electric Co. for aiding small manufacturers to tie-in and secure war production contracts.

The importance of vitamins, proper and adequate nutrition, as well as recognition of the part the gas industry is taking in national nutritional affairs, were all given appropriate attention by Utility Home Service women attending this Conference.

Currently it is planned to hold a series of meetings of the Sales and Advertising Section during the coming year, with each meeting devoted to a specialized individual group, where timely topics and informal discussions of them can be most fertile in furthering a ready exchange of operating information.

The "Duration-ize" Repair Service Program

By O. E. RUSH

Pacific Gas and Electric Co., San Francisco, California

ON JANUARY 1 of this year we in Northern California had almost decided that promotional programs and campaigns of the kind we knew in the past were simply out for the duration of this war. Some four months later, however, we found ourselves hard at work on a program which will need more than the usual promotional effort, one which is geared definitely to the changing conditions we find today.

All utility companies have been seriously affected by the limitation and freezing of appliances, and will probably be more so before it is over. Likewise, my company was being affected from the point of view of decreased revenues. However, the third partner in this industry, the appliance retailer, was the one who was being hit the heaviest, and our main objective was to help the many dealers who otherwise would be unable to combat this new situation successfully. They had to find a substitute for new appliance sales if they were to survive.

With that in mind this Repair Service Program was developed with the help of industry guidance and planning. It was built around "Authorized Repair Service Dealers" who were selected and appointed by their manufacturers or suppliers as qualified to do repair service work on specific makes and types of gas and electric appliances. It was designed to help the Industry carry on and be in a position to take advantage of new appliance markets again when the war was ended.

The Pacific Gas and Electric Co. launched a three months' campaign, a regular old-fashioned publicity campaign, on June 8 to introduce this Repair Service Program. It employed all the type of media ordinarily used during industry campaigns.

A new word had to be coined to get our slogan. That word is "Duration-ize." I think it tells the story. In the proof of the first advertisement which broke in over 400 newspapers throughout Northern and Central California during the week of June 8, the slogan was "Duration-ize Your Appliances with Timely Repair" and the by-line "A Wartime Necessity."

At the top of the advertisement was a heading "Invest for Victory" and a request to buy War Bonds and Stamps. This heading was carried on all advertisements, bill boards and other media used.

The copy of the ad tells the reader, our customer, that he is living in changing times now, that the war must be won, and to do that the appliance industry has been called upon to make sacrifices in metals needed to win the war. He was told that this means no more new appliances. Therefore, the need for taking care of existing appliances and having them repaired, with factory made replacement parts, was getting stronger and stronger.

INVEST FOR VICTORY
BUY WAR BONDS & STAMPS REGULARLY AND OFTEN!
A WARTIME NECESSITY—
Duration-ize your appliances with timely repair!
There are not going to be any more appliances manufactured for home use for an indefinite period. That is final until the WAR is won decisively and conclusively by the United Nations. So we are going to be a lot more careful in the use of all things we own and we must keep in good repair, all of the mechanized equipment used on the Home Front. Household appliances are the mechanized equipment on the Home Front. In the past, unintentional neglect of such equipment was not particularly serious. We could always buy new and better and more efficient equipment. BUT NOT now! That is NOT for the duration!
★ We must — all of us in the U. S. A. — Duration-ize our home appliances with timely repair. It is a wartime necessity. So to meet this necessity, this Company, and the manufacturers, and the dealers from whom you bought your appliances, have set up a service of repair. It means a check-up service to improve the operation efficiency of the household appliances. It means a repair service with factory-made replacement parts to restore appliances to efficient low-cost operation.
★ Take a look at your appliances today. Will they see you through the war? You will be wise to Duration-ize with timely repair.
Authorized SERVICE and REPAIR
Ask our local office for name of
AUTHORIZED SERVICE and REPAIR DEALER
P·G and E PACIFIC GAS AND ELECTRIC COMPANY

Sample of advertisement used to introduce Pacific Gas & Electric Co.'s Repair Service Program.

At the bottom of the advertisement appeared the Authorized Service and Repair sign and the words "Ask our local office for the name of Authorized Service and Repair Dealers."

The second advertisement which broke during the week of June 22, had the same slogan and ending, but featured the Customers' Victory Pledge. There were similar advertisements during July and August, for a total of eight, appearing in over 400 newspapers. They represented a total space cost of approximately $27,000.

In addition to this basic publicity coverage, there were 400 24-sheet poster boards carrying the same slogan. They appeared on every important highway and strategic point in cities and towns in our area. Sixteen hundred truck cards on company trucks, with the same design as the poster board, and carrying the same slogan, took this story to neighborhoods. Display cards, 20x30, including the campaign slogan, plus the phrase "Ask us for the name of Authorized Repair Service Dealers," were used on display floors and windows in every company office. In addition, a cooperative advertising plan was set up to pay 1/3 of space cost of dealer tie-in advertising during this three-months' campaign.

All of this publicity represents a total cost of approximately $40,000. In addition to this comprehensive campaign there were many dealer helps furnished regularly to appointed repair service dealers.

Two kinds of display material were prepared for "Authorized Dealers." First: A display card. Second: An attractive decalcomania similar to the shield design in the newspaper advertisements. Several designs of direct-by-mail literature were supplied at a very nominal cost, just to make them worthwhile. Samples of this literature, with order blanks, were sent to each dealer for selection as soon as authorization was made.

In addition, for the first time company people actively solicited repair

work and referred prospects and customer inquiries to specific dealers who had been authorized to work on the particular type and brand of appliance involved. Salesmen, during their in-the-home calls, discussed appliance repair needs with customers. Lists of authorized dealers in each locality were carried by these salesmen, by company servicemen, and by office personnel, as reference in their repair recommendations to gas and electric appliance users. Prospects were referred to Authorized Dealers in every instance. Furthermore, company Dealer Sales Promotion Men worked with Authorized Dealers, helping them set up their individual repair service programs.

This was the program. It required a tremendous selling job, not so much to the public, as to qualified appliance dealers. Many dealers have considered the repair business as an unwelcome step-child, something which was a necessary public relations gesture but of very minor consequence compared to their sales activities. Volume has not been large because normally people are not interested in having their appliances repaired. They can easily be sold new ones, and dealers have taken, rightfully, the stand that new appliances, more modern and more efficient, are the answer to old ones needing repair.

Now times are changing and we all must change with them. Appliance repair business may expect a tremendous growth, both from necessity and because people will be educated to the need for having this work done. Dealers will be required to give their personal attention to this phase of the business promotional-wise, something they have not done in the past. The volume will be tremendous, and on that basis, perhaps it can be made to pay dividends. Yes, we are told that the repair business is not a profitable business. This program is not going to be helpful to every dealer; repair work is not the only answer. Yet we see many repair specialists doing this business for appliance dealers, and doing it at a profit. We know of a great many appliance dealers who have made their repair service departments pay dividends. Magazines are full of articles now about appliance dealers making repair service pay dividends. So we cannot necessarily take the dealer's word for it that there is no money in it for anyone. Appliances have got to be repaired, and it is up to us to sell qualified dealers on the idea and help them organize so that it will be profitable.

One of the 400 24-sheet posters carrying the "Duration-ize" message.

Already, people are becoming increasingly conscious of their appliances, of a need for taking care of them, and of having them serviced promptly. For example, the Red Cross in San Francisco asked us to prepare a series of lectures to be given at various Red Cross centers on this very subject. A three-lecture series was prepared, and when the first was given at the Alta Plaza Center, there was such an overflow that the lecture had to be repeated three times.

Manufacturers and wholesale suppliers have a responsibility, a very definite one, in this program. They must select dealers whom they can trust to perform satisfactory repair work on their appliances and keep them in operating condition throughout the emergency. They must help their dealers train personnel for this work. That is one of the big problems—trained personnel. They must make available to authorized dealers repair parts at a figure that will be profitable. Finally, they must stimulate and help these dealers organize repair set-ups.

We think this program fits our method of operation better than any other plan we have had an opportunity to study. Admittedly, it brings up problems which must be solved. But we are confident that it will work, that it will perform a needed service to customers and to dealers in the territory we serve.

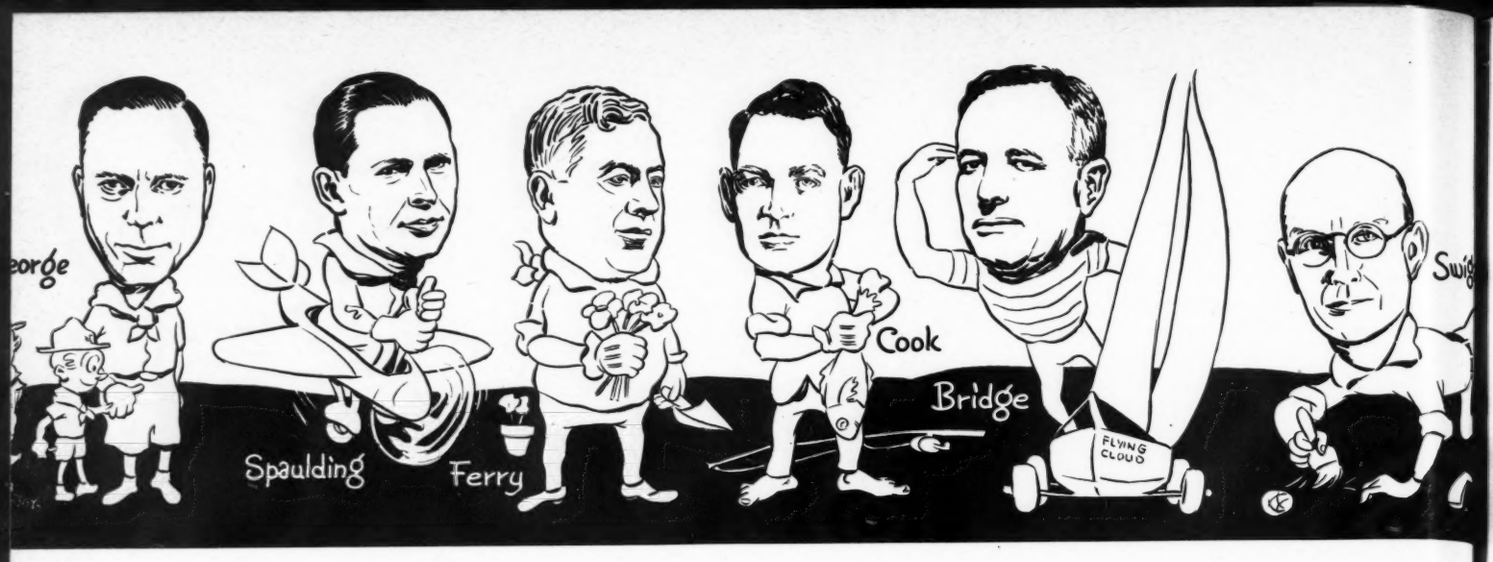
Steel Cutting with Natural Gas

By E. L. KELLS

Construction Engineer, Southern Counties Gas Co., Los Angeles, California

RECENT difficulties in transportation and a deficiency of steel cylinders for storage of acetylene, have caused considerable interest in the use of natural gas for cutting in ship and steel yards. In several cases this interest has led to comprehensive field tests to determine the relative efficiencies and economies of natural gas and acetylene, and in all tests we have witnessed, the conclusion has strongly recommended the use of natural gas.

Theoretically it requires more oxygen to liberate a B.t.u. from natural gas than from acetylene. A cubic foot of oxygen combining with acetylene liberates 725 B.t.u. per cu. ft. of oxygen consumed, whereas a mixture of natural gas and oxygen in theoretical proportions will liberate 513 B.t.u. per cu. ft. of oxygen. However, this difference is not particularly serious, as large quantities of acetylene and natural gas are burned only for the short period of preheating; after the cut has actually started, the fuel is reduced to a by-pass flame, and the oxygen used in either case for the cut will be the same. The oxygen used for the cut is large as compared to that consumed for the preheating, and increasingly larger as the cuts become longer. The difference in oxygen consumed during the preheat time, therefore, is too small a percent of the total to give much actual advantage to the acetylene. Because of variation in the ratio of preheating time to cutting time for different types of work, it is impossible to arrive at a precise comparison of oxygen consumptions by theoretical considerations only. Several field tests were conducted in the Los Angeles Harbor area during which careful ob-



servation of oxygen consumption was made to determine how much more, if any, is required for natural gas. In no case was the difference sufficiently large to offset the inherent variables in the field operations, and it is, therefore, safe to conclude that under practical conditions the extra oxygen required for natural gas is negligible.

In general, the straight cost comparison per B.t.u. is about 30 to 1 in favor of gas, even when the acetylene is generated in a central station in the yard. This generated acetylene costs about 1½c per cu. ft., 1783 B.t.u.

In field operation natural gas has many advantages easily noticeable during even a short test. Its lower flame speed would lead to the conclusion that it would be slower in preheating, particularly when the cut must be started by burning a hole through the plate. However, none of the companies who have tested or used natural gas have been able to notice any excessive lag on the start. It is possible to make a narrower cut with natural gas, and still have no welding back of the torch, and to maintain, even on these narrow cuts, a sharp kerf, something which cannot be done even with careful operation of an acetylene torch. A natural gas flame also produces less slag, and that slag is neither as hard or as tenacious, and is easily removed. The lower flame speed of natural gas produces a more stable and easily controlled flame which eliminates flash back into the torch head, and gives little trouble with blow-offs.

Preheating time with natural gas can be kept about as short as with acetylene if the flame is properly adjusted. A convenient criterion, is to bring the preheating flame to a point where it has a maximum hiss. All of the above advantages were noted in a hand torch and also in radiographs.

There is a general impression existing to the effect that high pressure gas must be used for cutting, especially as the cuts become thicker. None of our tests have been able to confirm this, and we have succeeded in making heavy cuts with gas at ordinary distribution pressures. Thicker cuts require considerable more heat to raise the temperature of the piece to the cutting point, and therefore, the preheating flame must be larger. It is this necessity for larger quantities of gas through small hoses that has given rise to the belief about high pressures. Pressure drop through small hoses that are 50 or 100 ft. long, and then through small needle valves, such as are usually found in a torch, is tremendous when passing the large quantities of gas necessary to preheat a piece of steel 10 or 15 in. thick. Some torch companies make a torch with an inspirator built into it, so that the high velocity of the oxygen jet will inspirate the natural gas, and they are thus able to pull more gas through the hose than would flow through without this depressed terminal pressure. Replacement of the small hoses with 5/8-in. or 3/4-in. hose eliminates much of this trouble and thick pieces can be cut with low gas pressure. Head pressures on most torches are on the order of a few inches of water, and care must therefore be exercised in reducing the pressure drop between the gas piping and the torch head.

All of the above factors have been confirmed by long period usage in the plants of several companies in the Los Angeles area. One of these was originally cutting with bottled acetylene, and switched to natural gas to eliminate the bottles and reduce their fuel cost. Tremendous savings in their fuel costs were apparent but an acetylene generator company convinced them that by installing a generator they could so lower their acetylene cost that this saving, accompanied by the claimed saving in oxygen, would more than offset the cost advantage of natural gas. An acetylene generator was installed and used for three months during which time an accurate record of the cutting time and oxygen was kept, and the company was unable to find any decrease in the oxygen consumption. The generating plant had become quite a cost item so it was scrapped and the company has since been using natural gas for all cutting, a matter of some eight years.

It is almost universally the opinion of those who are using natural gas at present, or who have conducted the above described tests, that gas is extremely practical, inexpensive, and possesses many advantages in the quality of the work produced.

There is an understandable reluctance on the part of those torch companies which also sell acetylene to give full cooperation in any program involving changing tips on their torches to accommodate them for natural gas. Some cases developed in which acetylene companies exerted pressure against any change to natural gas, and since acetylene is often handled in conjunction with oxygen, this sabotage is rather easily perpetrated. However, the obvious merit and economy of cutting with natural gas are of such magnitude as to make its use of easily perceived benefit, and obstructionists to the conversion to gas find it difficult to defend their views in most cases.

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Gas Industry Booms In Pacific Coast Area

At the end of five months, Pacific Coast gas consumers had increased 5.3% in 1942 over 1941, sales 16.9%, and gross revenue 19.2%. Gains were made in all classes of business, cubic foot sales increases being 24.4% in domestic, 10.4% in commercial and industrial, and 9.7% in electric generation.

Limitation orders will have an increasing effect on business for the balance of the year and it is not likely that these percentage gains can be maintained. Because of greatly increased operating expense and takes the net revenues of most companies are considerably less than last year.

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Coast Gas Co. Dissolves

The Coast Industrial Gas Co., a wholly owned subsidiary of the Pacific Public Service Co., San Francisco, plans to transfer its customers to the Coast Counties Gas & Electric Co., and will then go out of business.

A "Check Chart" Water Heater Service Program

By R. V. Davis

Supervisor Dealer Sales, Southern California Gas Co., Los Angeles, Calif.

SEVERAL months ago, before L-79, L-5-b, L-31, and their companions entered our life, at a time when the Southern California Gas Co. was just beginning to be advised in a preliminary way of coming events, one of our competitors began an "all-out" promotional program of electric appliances, chiefly electric water heaters. To meet this situation specifically and to lay a foundation for promotional campaigns that would be keyed to the changes brought about by the war, thought was given to the development of a program that would—

1. Determine what kind of promotions we could conduct and still not be acting contrary to the wishes expressed by the Government.

2. Determine what activities dealers could engage in when and if merchandising was stopped.

3. Determine what promotions could possibly be used to assist appliance dealers and plumbers during the war period.

As a result of this effort, the "check chart" hot water service program was evolved. Primarily applying to plumbers, it was hoped that this program would accomplish several objectives.

1. To insure that customers have been advised of the necessity and the desirability of making present hot water equipment last as long as possible.

2. To advertise "a gas for water heating story." The thought of post-war planning and post-war competition exerted an influence here.

3. To help the plumber (those that want to) get back into the plumbing service business. Our advertisements told our customers that plumbers can assist them to make their equipment last and can show them how to get maximum benefits from their equipment.

4. To assist plumbers: (1) To build a clientele for service work, looking toward that time when the sale of new equipment had been prohibited. (2) To secure sales on priority basis. (3) To build a prospect file for use after the war.

The program which was placed in effect and is being carried on currently was presented to the plumbers at a series of meetings. Distinct phases of the program can be described briefly as follows:

1. The basic element consists of a series of advertisements (Fig. 1) containing the facts relative to satisfactory hot water service, the importance of taking care of present water heating equipment and stressing the part which the plumber can play in rendering a valuable service to customers.

The advertisements were designed in part from material which had been compiled for the plumber training courses given under the direction of the State Department of Vocational Education in 1940. In all of the advertisements the water heater itself is subordinated to the basic topic, and the advertisements tie into the Government health and conservation program.

2. A second element in the program results from the fact that a great many plumbers have not been active in service work and therefore are not familiar with all of the water heaters sold in this area.

In order to assist plumbers to render proper service to customers calling on them, schools were held by the customer service department. As many makes of water heaters, thermostats, etc., as possible were discussed and studied by the plumbers attending these schools.

Who'd ever suspect there are
Nine kinds of Baths!
(AND ALL GOOD FOR YOU)
One bath peps you up, another helps you sleep!
GAS
HEATS WATER FASTER - COSTS LESS
HOT WATER

FIG. 1. Sample of advertisement used to promote Southern California Gas Co.'s water heater service campaign.

3. A special check chart (Fig. 2) was developed by our representatives and a committee appointed by the Association of Master Plumbers. The use of this chart is encouraged. The chart not only helps the plumber but helps insure, in so far as possible, that the customer receives full value from his call on the plumber for service. A charge is usually made by the plumber for this service.

4. The use of a specially designed pamphlet containing all necessary directions and data for laundering all kinds of materials, as well as information pertaining to proper bathing, house cleaning, and all other uses of hot water in the home, was incorporated in the program. This pamphlet is being used as a traffic builder for plumbers' stores by advertising it as a give-away item.

5. One important part of the program involves the use of direct-mail solicitation. The company maintains utilization survey data which is obtained from customer servicemens' calls. From this data, lists of persons having old gas, electric or manual water heaters can be secured. Further, these lists can be compiled by marketing areas. These lists are made available to plumbers upon request. The company prepared sample letters and furnished the plumber with copies of the letter of his choice. The company addressed the envelopes, which are furnished by the plumber, and the plumber pays the postage.

A promotion of this kind needs a lot of "push" behind it if it is to enjoy any considerable amount of success. The responsibility of supplying the "push" was assigned to dealer representatives.

Each dealer representative called on the plumbers in his district and explained the plan to them, and received an expression from each plumber whether or not he wished to participate. If the answer was in the affirmative, the dealer representative released the necessary supplies, arranged for any direct-mail projects, and kept in

CHECK CHART

SURVEY FACTS CONCERNING YOUR PRESENT WATER HEATING SERVICE

Name_____ Date_____ C.O.D.____ Charge____

Address_____ Type of Building_____ (House, Apt., Bus.) Owner: Yes____ No____

Make of Heater_____ Trade Name_____ Serial Number_____ Size____

Type of Heater: Instantaneous____ Storage____ Booster____

Year Installed_____ Adequate Capacity: Yes____ No____

Heater Location: Basement____ Closet____ Back Porch____ Kitchen____ Other____

Location is cause of excessive heat loss: Yes____ No____

CHECKED		WORK PERFORMED	
1. Faucets for Leaks	☐	1. Installed Washers	Number ☐
2. Faucets for Loose Washers	☐	2. Installed Valve Seats	Number ☐
3. Water Hammer (shock pressure)	☐	3. Cleaned Main Burner Ports	Yes ☐ No ☐
4. Number of Hot Water Faucets	☐	4. Cleaned Heating Surface	Yes ☐ No ☐
5. Hot Water Pipes for Leaks	☐	5. Cleaned Pilot	Yes ☐ No ☐
6. Fixture Drain Stoppers	☐	6. Cleaned Thermostat	Yes ☐ No ☐
7. Water Pressure: Excessive Yes ☐ No	☐	7. Adjusted Thermostat	Yes ☐ No ☐
8. Cold Water Inlet Valve	☐	8. Inspected Water from Heater Yes ☐ No	☐
9. Main Gas Valve to Heater	☐	Clear ☐ Rust ☐ Sand ☐ Lime	☐
10. Pressure Relief Valve	☐	9. _____	
11. Shower Connections for By-Pass	☐	10. _____	
12. Heater for Lime Deposits	☐	11. _____	
13. Vent for Condensation	☐	12. _____	
14. Draft Conditions	☐	13. _____	
15. Main Burner Flame	☐	14. _____	
16. Pilot Adjustment	☐	15. _____	
17. Pilot Location	☐		
18. Water Temperature ____°Fahr.		Remarks:_____	
19. Automatic Pilot Yes ☐ No	☐		
20. Heater Vented Yes ☐ No	☐		
21. Proper Draft Hood Installed	☐		
22. Roof Caps	☐		
23. Type of Tank:			
a. Full Floating	☐		
b. Flue	☐		
24. Thermostat Location:			
a. Side	☐		
b. Bottom	☐		
25. _____			
26. _____			

If the original guarantee on this water heater has previously expired, this check-up does not constitute a re-guarantee for any future life of the appliance.

Signed_____ (Firm Name) By_____ (Plumber)

FIG. 2. The check chart.

touch with him in order to compile any tangible results.

The number of plumbers participating is 328. It is recognized that many plumbers are not organized to follow through on this kind of work, while others are not interested in relatively small service jobs. The following figures on supplies issued have been tabulated from dealer representatives' reports:

Banners	357
Check chart pads	512
Counter-truck cards	791
Price tags	877
Pamphlets	7,965
Letters	93,050

There are numerous indications that many plumbers who have not had time as yet to participate in the plan, or who do not intend to do so, are favorably impressed with the publicity the gas company has given their industry.

Reports taken from dealer representative memos concerning cooperating plumbers indicate that the water heater service campaign is catching on and is already the direct cause of some increased business. This condition is substantiated by the numerous reports from cooperating plumbers.

Many plumbers have "welcomed the plan" and "report continued progress in service business." Those plumbers who have just begun mailing and are using check charts for the first time are promising "to do their utmost to trace all inquiries." One notable case is found in a plumber who has not participated in the program to date, and yet is receiving calls for booklets and information as advertised in the newspapers. Approximately six plumbers have reported no interest or that they have had no results from their efforts.

Standby Plants Urged in Colorado Gas Shortage

FACTORIES and industrial plants in Denver, Colo., which are not directly producing war supplies have been requested by the industrial gas department of Colorado Public Service Co. to install standby equipment to save gas during the coming winter—as part of a program to cut down consumption in order to keep war plants in operation.

This plan, as well as careful proportioning of gas to all war plants, has been necessitated by the unprecedented industrialization of the Denver area, according to the Colorado gas utility division. Coupled with the opening of new army air fields and training bases, munitions plants and factories, the inability of the company to bring in additional pipe lines will create a serious emergency on the system during the winter ahead. Gas load has been at peak proportions during the entire summer period, and will undoubtedly transcend all capacity unless it is possible to reduce gas consumption by large non-defense users.

A list of approximately 20 first-call gas customers has been developed, and these 20, all military or war-production plants, will be served before gas flows through any other main, according to the industrial department.

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Gas Refund Order Signed By Arkansas Commission

The Arkansas Utilities Commission has signed an order reducing natural gas rates in five Southeast Arkansas towns estimated at $4600 annually and directing a refund of $3300 to consumers at McGehee, Ark. Affected by the reduction are McGehee, Dermott, Lake Village, Eudora and Wilmot, served by the Arkansas Power and Light Co., with gas purchased at wholesale from Memphis Natural Gas Co. Consumers in the five towns will receive a further reduction if the commission wins its fight with the Memphis Natural Gas Co. for reduced rates. The commission has filed a complaint with the Federal Power Commission charging that rates charged by the Arkansas Power and Light for gas are discriminatory.

■ ■

FPC Sets Hearing Date On Arizona Gas Rate Case

The Federal Power Commission announced August 10 its order setting a public hearing for 9:45 a. m., September 9, 1942, in Washington on proceedings resulting from a complaint by the State of Arizona against the Western Gas Co. and El Paso Natural Gas Co. and an investigation, instituted on the Commission's own motion, of the same two companies and the El Paso Gas Transportation Corp. The Western Gas and El Paso Transportation companies are subsidiaries of El Paso Natural, and all three companies have their principal offices in El Paso, Texas.

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New Listing of A.G.A. Approved Gas Appliances

The American Gas Association has released an August 1 supplement to the July 1 issue of its directory of approved gas appliances and listed accessories. Included are new models approved under American Emergency Standards as well as those receiving approval under American Standards.

Gas Consumption Per Meal in a Large Mess Hall

By OTTO KETELSEN

San Diego Gas and Electric Co., San Diego, California

THIS information will add to data collected in other localities covering the consumption of gas per meal in the preparation of food in large quantities.*

However the galley and mess hall described is much larger than others reported, and is much more complete in equipment. The normal capacity of this unit is for 5000 men, but it can be operated efficiently with less men, or in an emergency it can accommodate double that number. This flexibility is due to the fact that there are four separate dining halls with cafeteria serving tables for each hall. Each wing in addition has its own machine dishwasher and steam cabinet for sterilizing racks of service trays and dishes. These cabinets can also be used for reheating food and for steam cooking chops, cutlets and the like, which were browned on a fry top.

The galley is located in the middle of the four wings or mess halls. Six sections of heavy duty ranges with ovens are used. In addition there are four, 24 by 34-in. deep fat fryers and one 8-shelf revolving tray roasting oven. This oven has extra heavy stabilized shelves, and drip pans are arranged under the shelves to prevent an accumulation of grease and spillage which might cause a fire. The oven is indirect fired into a brick tunnel which is vented through four laps of heavy pipe in the bottom of the oven. This completes the direct fired gas equipment in the galley.

The steam operated equipment includes 12 large steam jacketed kettles, four 150-gal. coffee makers, and four steam cabinets and the dishwashing machines. Two 100-gal. hot water tanks are indirectly steam heated.

Two gas fired 50-hp. boilers furnish the steam for the above equipment. Actually these boilers are delivering about 75 and 80 hp. each and one more similar boiler is to be installed to insure adequate capacity.

During the 30-day period the number of rations served was counted, and this, with the gas consumption, gave an exact per meal cost for the gas. It was 4.67 cu. ft. per meal. The heating value of the gas averaged 1100 B.t.u. resulting in an average of 5037 B.t.u. per meal.

This is approximately 1 cu. ft. per meal higher than reported by J. H. Gumz in a survey prepared on some Northern California camps. It is also higher than was found in a smaller camp in the San Diego district. The additional consumption is undoubtedly due to added hot water consumption in the machine dishwashers.

*See "Gas Usage in Military Establishments" by S. A. Wright, Proceedings, P. C. G. A., Vol. 32, P. 57, 1941, and GAS, February, 1942, P. 30, P. C. G. A. Gas Utilization Bulletin No. 105, by J. H. Gumz, Dec. 1941.

Airplane Engine Heating Cabinet

By E. H. ADLER

Industrial Sales Engineer, San Diego Gas and Electric Co., San Diego, California

AS received from the engine plant, air-plane motors are coated inside and outside with a thick covering of heavy oil. They are ready for operation, with spark plugs, wiring, magnetos or coils, etc. The sub-contract manufacturer must further equip these engines with exhaust manifold, tail pipe and cowling. To insure proper inspection the motor must be run before delivery to the assembly plant. Obviously, the heavy oil coating must be removed from the outside of the unit. In addition, large drops of thick oil on the interior working parts have caused breakage due to the extremely small clearances.

Engines are taken from stock and placed on racks with casters to form an assembly line. They are then wheeled into individual heating compartments, held at 160° by recirculated air for a period of about four hours. This temperature causes the excess oil to drain off but is not high enough to injure rubber, plastic or insulation already in place. Upon removal the engines are cleaned with solvent and the exhaust and cowling assembly is completed.

The cabinets, in groups of four, are supplied with forced warm air, circulated by a system of supply and return duct work. The top of each cabinet has a warm air plenum with 36 3-in. holes to supply heated air to the interior. Cabinets are spaced 12 in. apart and the lower portion of this space is used to return air from both sides of each compartment. The end compartments have additional return ducts to secure uniform distribution. The furnace recommended is a unit having a cast iron heating element and blower with sufficient capacity to cause rapid air circulation. A throttling control is placed in the bonnet to maintain air delivery at the desired temperature of 160° to 180°. No fan switch is required, but the unit should also be equipped with thermocouple-type safety pilot, solenoid valve and electric limit control.

The compartments may be made with wood frame work and double plywood walls, with some provision on the floor to catch the oil which drains off. While sheet metal duct work has been used, suitable soft building materials could be substituted. The blower should deliver about 3500 c. f. m. against system friction which can easily be kept under ¼ in. The furnace input may be 250,000 B.t.u. or more, depending on type of construction, recovery capacity and similar factors.

In general, these aircraft plants will have a multitude of operations of a similar nature. Many departments have drying or low temperature heating operations where equipment like that described would serve an efficient and satisfactory purpose.

With aircraft production constantly increasing for war purposes, and with excellent prospects that many of these gains will be supported by post-war peacetime needs, aircraft plants are an important market for all types of commercial and industrial equipment.

The Gas Industry and the Nutrition Program

By GLADYS B. PRICE

Home Service Supervisor, Southern California Gas Co., Los Angeles, California

IT SEEMS only yesterday that Home Service was spending much time trying to convince somebody that it was a vital part of a selling organization. Today we have nothing to sell, and in a few short months we have converted practically every Home Service woman into a nutritionist.

It isn't necessary for me to relate how important this National Nutrition Program is. My job is to outline *what* the Gas Industry, through Home Service, has been able to do.

It has been said that home economists hold the most strategic place in the program, "Nutrition for Defense." This is because of home economics training and long years of demonstration work with women's groups. At the present time almost every Home Service Department throughout the Gas Industry is connected with the Nutrition Program, either through Red Cross, Civilian Defense, or State Nutrition Councils. By far the largest cooperation is with Red Cross, since they were already organized.

Rochester, New York, in cooperation with the Gas Company, put on a "Food for Freedom" parade early in the year. Exhibits were prepared, demonstrations given and booths set up for individual nutrition advice. This was a particularly successful project, and received nation-wide publicity.

In New Jersey, Home Service Departments volunteered to assist in utilizing the mammoth peach crop. Radio talks, recipe pamphlets and canning helps were given to save the fruit.

Many advertising departments are cooperating with Home Service to design window displays that tell the nutrition story. In New Orleans, two or three complete windows are designed each month.

Radio programs by Gas Company home economists are rapidly being designed to carry the nutrition story, as well as to provide information which used to be given on home calls. Kansas City has 30 home service women, all helping to promote the National Food Program, mostly through Red Cross. These are but samples of work being done in every Home Service organization throughout the country.

Since advertising is the greatest medium in carrying the message to the people, it is very gratifying to know that early this year the American Gas Association set up a Nutrition Committee, composed of Management, Sales, Home Service and Advertising. Its function is to prepare and distribute nutrition information, and to help local gas companies in cooperating with the National Nutrition Program. Our entire advertising program has, therefore, been slanted to further nutrition education.

Most of you have, no doubt, noticed many of the ads running in popular magazines as well as local billboards. Recently Home Service has compiled a series of menus, which are running weekly in the local papers.

The Home Service Committee of the American Gas Association has done an excellent job in compiling material and keeping various Home Service Departments informed as to possible cooperation with national nutrition organizations. "The Home Service Volunteer's Booklet" put out in January, 1942, contains a great deal of valuable material.

Servel, as an organization, planned and released a very fine project, called "The Home Volunteer Program." They have secured the services of Miss Ernestine Becker, nationally known nutritionist, whose articles are being made available to Home Service women throughout the country. This project was designed to make the local gas company the center of all nutrition information, and to carry through the Paul McNutt Conservation Program. It has the sanction of the various Federal agencies.

It might be well to ask what Home Service people will be doing on nutrition if war actually comes to our shores. There are many cases in which Home Service directors, because of the part they have played in setting up nutrition programs, have been appointed either on Red Cross Disaster Committees or on Civilian Defense, and in the event of disaster, they would be called upon to act as Canteen Chairmen, supervising the emergency feeding of whole communities. In two companies, at least, mobile canteens have been built, fully equipped, and staffed by the Home Service Department. While the principles of nutrition may be a second consideration in the event of disaster, nevertheless emergency feeding will be better because of the experience which these Home Service women have had. Nearly every Home Service worker is enrolled to take part as an emergency feeding helper.

This briefly, then, is a resume of how the Gas Industry is contributing in a big way to the National Nutrition Program. It is a natural for the industry, because people must eat and food must be cooked. Since nutrition is largely a problem of making the proper foods attractive enough to eat, gas appliances play a large part in determining the palatability of these foods. And while a nutrition program which is nationwide must, of course, be altruistic, such a program cannot help but advance the proper preservation of food and proper cooking methods. Therefore any nutrition program which does not tell people how to properly care for and prepare food will most certainly miss the mark. We have devised no way to make people eat foods which they do not like or which are unattractively prepared, no matter how nutritious they may be. On this basis, the Gas Industry, through its Home Service Departments, has a tremendous opportunity as well as an obligation, and I am sure the industry will be pleased and gratified to know that every Home Service Department in the United States is fulfilling this duty and privilege.

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Brooklyn Union Cooking School Stresses Economy

Exactly 1999 persons—no more, no less—turned out for the series of six Victory cooking school classes conducted by the Brooklyn Union Gas Co., Brooklyn, N. Y., which ended recently. Meetings were held at noon on Thursdays in the Empire Theater.

Theme of the lectures was how to stretch the food dollar and at the same time prepare dishes both appetizing to the taste and appealing to the eye. Particular emphasis was given to showing how the government's high nutrition standards could be fitted into present economy needs.

As a matter of fact, the cost per meal for a family of four on all the menus demonstrated averaged just slightly more than 28¢ per person. This included a serving of milk at each meal for children, the use of fresh vegetables only, and took into account the buying of packaged foods such as flour, cereal, coffee, vinegar, all of which last for considerable periods of time.

ACCOUNTING SECTION

Statement of the General Chairman

By L. W. COUGHLAN

General Chairman, Accounting Section, Pacific Coast Gas Association

FOR many years it has been the customary practice for members of the Accounting Section to meet but once a year at the Annual Convention for the purpose of discussing problems that were of mutual interest to the accounting executives and employees of the gas untilities. The short period of time allotted on the Accounting Section's program for discussing these common problems limited the discussions to such an extent that the Executive Committee of the Accounting Section decided a change would be beneficial.

At the 1941 Fall Meeting of this Committee, which was held in conjunction with the Annual Convention, it was agreed that four invitational two days meetings of accounting specialists would be scheduled during the year. Each executive agreed to select one or two representatives to attend each meeting who would be qualified to discuss all phases of the topic selected. It was the belief that meetings of these representatives whose daily work brings them in direct contact with the selected topic, would be of real value in disclosing problems and suggesting their solution.

The following topics, dates, meeting places and chairmen were selected by the Committee at that time:

Internal Auditing—Oct. 23 and 24, 1941—San Francisco. Harry McGann, Pacific Gas and Electric Co., Chairman.

Payroll Accounting—Nov. 27 and 28, 1941—Los Angeles. George Kelly, Southern California Gas Co., chairman.

Purchase and Stores Accounting—Feb. 26 and 27, 1942—Santa Cruz. J. P. Schaefer, Coast Counties Gas and Electric Co., chairman.

Construction Cost Accounting—April 23 and 24, 1942—San Diego. George R. Gray, San Diego Gas and Electric Co., chairman.

All meetings were held as scheduled and the cooperation received by the Accounting Section of the Association from the accounting executives of the companies in selecting qualified representatives, contributed materially to the success of each meeting.

Each Chairman was asked to prepare a report on the two day meeting, furnishing the name of the attending representatives of each utility, the important points of the discussions and any recommendations of the group for consideration by the Executive Committee. The Chairmen were asked to attend the Spring Conference for presenting their reports and recommendations.

The activities of the Accounting Section for the current association year were brought to a close at the two day Spring Conference which was held in Los Angeles on June 11 and 12. The morning and afternoon sessions on Thursday, June 11 were reserved for members of the Executive Committee to discuss current problems faced by the industry as a result of World War II and other topics of mutual interest. Among the more important topics discussed at length at this meeting were:

(a) Priority Applications and Reports.
(b) War Bond Purchase Plan for Employees.
(c) Protection of Company Property from Sabotage.
(d) Protection and Microfilming of Important Company Records.
(e) Conservation of Automobile Tires.
(f) Bi-monthly meter readings.

The morning session of the Spring Conference on June 12 was devoted to presentation of reports by the Chairmen of the Group Meetings to the Executive Committee. It was disclosed the exchange of ideas has resulted in the adoption by some companies of procedures that have been proven successful by other companies. It was the unanimous decision of those present that results obtained were beneficial and valuable. At the meeting of the Committee following the closing session of the Spring Conference, it was agreed to hold four specialized meetings during the coming year.

At the concluding session of the Conference on Friday afternoon, June 12, three papers were read by the authors, each being followed by an interesting discussion.

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Natural Gas Co.'s Negotiate Gross Production Tax Bills

In agreed judgments entered in the 98th District court at Austin, four natural gas companies operating in Texas paid $87,964 in settlement of added gross production taxes claimed in suits filed for the state. Actions were against Texoma Natural Gas Co., Panhandle Eastern Pipe Line Co., Cities Service Gas Co., and Canadian River Gas Co.

Adapting Regulatory Accounts to Management

By GEORGE KELLY
Southern California Gas Co., Los Angeles, California

I. Limitations of Regulatory Classifications of Accounts in Providing Managerial Information

CLASSIFICATIONS of accounts prescribed by regulatory bodies are presumably designed for the primary purpose of providing those bodies with certain specific information to be used in rate-making.

Consequently, the operating statements of most utilities usually reflect the results of operations in a manner suitable for use by the regulatory body, but do not set forth the information in a manner most suitable to the needs of the utility management. The primary reason for this condition is that the regulatory classifications do not lend themselves readily to the departmental and functional segregation of expenditures so necessary to managerial control. The larger the utility and the more complex its operations, the less adequate are the regulatory classifications.

A usual compromise solution, which produces the results usual to compromise, is detailed subdivision of the scheme of accounts provided by the regulatory body in an attempt to make the necessary managerial information available. The writer's company has tried this solution, without producing an answer which is satisfactory from an operating viewpoint. Extreme subdivision usually defeats its intended purpose, since the results thus produced are often such a mass of detail that it cannot be assimilated and used by busy management.

It may be that our own accounting departments, while recognizing that a very real problem exists in this connection, are too easily satisfied with the thought that the fault lies with the regulatory classification alone. This is not necessarily true, since utilities are required to use the accounts prescribed by the regulatory commission only in actual reports and records required by them. The commission does *not* prohibit the preparation of operating statements designed to enable the management to exercise satisfactory operating control. We should not lose sight of this fact.

Consideration of the foregoing statements indicates that the title of this discussion is somewhat of a misnomer. Instead, the problem would be more easily solved by designing a classsification which meets the requirements of managerial control, and adapting the results thereof in a logical manner to the regulatory commission's requirements.

II. Designing a Utility Classification Along Departmental and Functional Lines

The responsibility for furnishing really useful operating statements is, of course, directly assignable to our accounting departments. These statements, in turn, must be based upon an account classification which will accomplish the desired results; if this classification can also fulfill the regulatory classification requirements, much has been accomplished. In some instances, a two-way assembly of certain basic information will be necessary. Whether this assembly be accomplished manually, by tabulating equipment, or otherwise, is not the point of this discussion.

The difficulties to be encountered in designing an account classification along departmental lines are numerous, and time limitations permit only a very general outline of certain aspects of the problem at this time. The problem is two-fold.

1. Since the primary purpose to be served is furnishing management with vital and useful information, a classification of accounts should be designed around the actual functioning of the various operating departments within the utility.

2. Having designed this classification of accounts to serve the needs of management, a means must then be found for translating these data into the system of accounts prescribed by the regulatory body, for the purpose of periodic reports required by it.

Primary points of design.

The design of the specialized classification of accounts will be discussed first. Eight important points are:

1. Its accounts must follow the natural lines laid down by the pattern of the utility's scheme of operating organization; the organization charts of its various line and staff departments will usually provide the key to this first important point of design.

2. Expenditures assembled by these accounts must follow strictly the lines of departmental *responsibility* for such expenditures; inter-departmental charges should be eliminated if possible; when they do exist, their source should be indicated if their amounts are significant.

3. Expenditures assembled by these accounts should be correlated with physical operating statistics on work accomplished as far as possible, to the end that a co-ordinated single set of financial and physical data may be available. This will eliminate the inconvenience (and oft-times embarrassment) which arises both from the absence of this correlation, and from the occasional presence of "several sets of answers" to the same problem.

4. The showing of related quantitative data, such as hours of labor, miles or hours of transportation equipment usage, or quantities of significant materials, is highly important —often more important, from an operating viewpoint, than the dollars to which they may relate. Prices paid for labor and materials are very often beyond the control of operating officials except in a very general way. When the quantitative information is available, it is then possible to resolve the dollar results shown by operating statements into the elements of changes in quantity as well as changes in unit price.

5. The number of account subdivisions should be kept to a reasonable minimum, since the greater their number, the less individual accuracy is attained, and the cost of accounting, both field and office, mounts as subdivisions are increased. It is far more important to provide busy management with broad, essentially accurate groupings of expenditures than to provide finely detailed data whose very bulk minimizes their usefulness. The analysis of many of these relatively broad functional subdivisions can often be made to better advantage in the form of a functional analysis of direct labor hours (not dollars) included in the account, to avoid extensive subdivision of many small expense items. This functional analysis will be discussed in more detail later.

6. The classification should disclose information on the gross expenditures accumulated in clearing accounts, such as those for storeroom operations, construction tool and

equipment costs, and transportation costs. It is far more important, as a control matter, to show these in the aggregate, before their ultimate allocation, since the accounting distribution of these items is almost entirely beyond the control of operating officials.

7. A similar treatment should also be accorded the classification as it applies to so-called "service" departments, such as shops, laboratories, staff engineering departments, and other similar departments. In the usual scheme of accounts, expenditures made by these departments are buried in the accounts of the departments for whom the service was performed, and essential control is lost thereby. Since significant sums of money are often expended in these service departments, a desirable answer is a scheme of accounts which will show both (1) what was expended, and (2) for whose benefit. In this way, the cost of work performed by these departments can be compared with the cost of similar service performed by outside parties.

8. While the ultimate segregation of all expenditures between income and balance sheet accounts must be observed, a well-rounded classification designed to provide information for operating control would minimize the accounting significance of this division, and would provide, if at all feasible, information on each department's expenditures chargeable to capital, as well as to operations. This would be particularly true in the case of capitalized items of a routine sort, such as those for installation of services, meter set assemblies, and small main extensions.

Numbering systems.

Most companies will use some sort of departmental numbering system to indicate account subdivisions in each classification. The exact arrangement of such a numbering system must necessarily vary with each individual company. To perform a departmental and functional segregation of expenditures, some sort of two-part number is necessary; one part of which (usually the prefix) would indicate the department or division with which the expenditure originates, and to which the responsibility for such expenditure is assigned. The second part of the number would indicate the functional segregation of the expenditure to conform to the particular activity within the departmental organization.

For illustrative purposes, prefix numbers 1 to 99 might be used to indicate the departmental or divisional phase of the numbering system. Numbers 100 to 999, inclusive, might then be used to indicate the functional segregation of costs. This numbering arrangement is purely arbitrary and would necessarily be modified to meet the particular needs of the company.

Departmental subdivisions.

The departmental or divisional segregations of expenses, as set forth in the prefix portion of the two-part account number, are relatively simple. The organization plan of most companies will quite readily divide its departments and divisions into "staff" departments and "line" departments. If a company's operations are segregated into geographical divisions which function more or less independently, each division may, in turn, be subdivided according to certain major departmental responsibilities. If the organization scheme of the company is strictly followed by the operating departments, the selection of appropriate departmental or divisional prefix numbers for the classification of accounts will usually offer no difficulties. The principal thing to be avoided here is too great or too extensive departmentalization, since breaking down each department into too large a number of sub-departments often defeats the intended purpose of the departmental classification.

If it is not found possible to subdivide the classification departmentally, the fault will usually be found in the actual organization of the company. A remedy of this condition is probably beyond the accountant's usual scope of activities, but where serious cross lines of authority and responsibility exist, a departmental classification will point them out, and at least make the conditions known to management so that suitable remedies can be applied.

Functional subdivisions.

The functional segregation of expenditures must necessarily cover a much longer list, although it is seldom that all of the functional subdivisions of a classification will be used by any one department or division. Since the thing we are trying to accomplish is to show to each department a picture of its controllable expenditures, it is highly desirable to exclude apportioned cost items (such as those often accumulated in clearing accounts for stores, transportation and tool and equipment costs) from the functional accounts. As a practical matter, this cannot always be fully attained.

The functional segregation of expenditures seems to fall into three major groups:

1. *Departmental administration, supervision and overhead.* The principal groups of items under this sub-heading are the following: Administrative and supervisory salaries and expenses; office and clerical salaries and expenses; office supplies, expenses and space charges, such as rentals, light, heat, water, telephone, etc.

2. *Indirect costs.* This is a relatively difficult group of costs to cover in a departmental and functional classification, for they are in themselves both departmental and functional in nature. Principal examples of these are the types of expenditures which are often accumulated in clearing accounts, such as stores expense, transportation expense, tool and construction equipment expenses.

The particular problem which arises in treating with these costs is that there are often centralized major departments for warehousing, for transportation equipment handling, and for tool and construction equipment handling. In turn, these costs are often incurred, as a functional matter, within other departments or divisions whose primary activities are in other directions.

It should be the first aim of the departmental and functional classification to show these expenditures as a gross total in the accounts of the department or division by whom they are incurred, and statements of these expenditures should also indicate that they are eventually redistributed. When the department ultimately charged has essential control over the redistribution of these costs (as, for example, in the case of automobile usage) these redistributed costs can then be logically included, and shown as recharged items, in the statement prepared for the department thus benefited. If such a control does not exist, it is generally desirable that the redistribution of these costs be treated as strictly an accounting problem for ultimate allocation among the regulatory classification subdivisions.

3. *Departmental "direct labor" functional activities.* These are the activities within the department to which it is practicable to assign directly the labor, materials, and other direct or semi-direct costs. There will necessarily be a relatively long list of these. The important thing is that these particular functional subdivisions be made as broad as possible.

It is to the subdivisions of *these* functional activities that the usual operating and maintenance portions of the regulatory commission's classifications most nearly apply. At this

point, it seems important to select these functional subdivisions according to the operating information which it is desired that they furnish, and to disregard, or at least minimize, the element of convenience in the ultimate conversion of these account segregations into the regulatory classification of accounts.

Apportioned costs and interdepartmental charges.

Treatment of these items in a departmental and functional classification must depend somewhat upon the answer desired.

One solution is to record them in the functional account of the department benefited, but to separate these charges, through analysis columns on the departmental operating statements, from those incurred and directly controllable by that department. This would result in a segregation of expenditures, both direct and indirect, under each departmental function, something as follows: (a) Directly controllable labor, materials, and other direct charges. (b) Charges made by "service" departments, etc. (c) Apportioned transportation, stores, tool costs, etc. (d) Total.

An optional solution would be to provide a fourth group of accounts in each departmental series, to show these apportioned costs and interdepartmental charges as totals by major sources, without attempt to allocate the charges according to functions served within the department.

Special problems.

Working out a departmental and functional classification will offer some specialized problems in each individual company. As examples of these, work order and job order systems will have to be reviewed and adapted to the departmental and functional answer which is ultimately desired. Some practical compromises must necessarily be made to avoid vast elaboration of accounts and unnecessary exactness on unimportant matters.

Accounting departments must necessarily consider the cost of doing a job on this basis, both internally and as it may effect field cost reports and basic information received from the various operating departments of the company. This procedure will entail keeping the equivalent of one and a half or two correlated sets of records, and the cost of doing this must necessarily be weighed in light of the benefits produced. After all, the accounting department must "get its books "closed," and the practical aspects of that matter cannot be overlooked.

It is the writer's opinion that a classification of this sort, properly designed and made use of, should more than offset the additional costs incurred in its preparation and maintenance.

III. Conversion of Results to the Regulatory Commission's Classification

The results shown by a departmental and functional classification of accounts must ultimately be distributed to the accounts prescribed by the regulatory body, to conform to their requirements. It would seem that this problem is primarily one for the accounting department to solve, since the result of this conversion is not of general interest to the operating officials of the company. Its primary interest is to the relatively few departments and individuals who are concerned with rate-making matters, and with reports submitted to regulatory bodies.

Many of the segregations shown in the departmental and functional classification can be carried across bodily to the accounts prescribed by the regulatory body. In other instances, allocation of the results shown by the operating classification must be made by the accounting department on a sound accounting basis. The essential requirement of this conversion would seem to be that the source of all the figures used in producing the regulatory classification answer be clearly traceable to their original source in the scheme of accounts developed for managerial purposes.

IV. Functional Analysis of Labor Hours

About two-thirds of the operating and maintenance expenses of most gas utilities (excluding gas purchased) is composed of labor. Whether labor is applicable to construction or to operation, it is by far the largest readily controllable item of cost entering into a utility's expenditures. Because of changes in wage rates, over which operating departments often have little control, the showing of labor costs in terms of dollars tends to have a very general value only.

In lieu of an extensive subdivision of the account classification to provide great detail on expenditures, it is suggested that gas utilities can give consideration very profitably to a functional analysis of productive and nonproductive labor *hours* by detailed functions in each department. The preparation of such a functional analysis will greatly simplify the account classification through elimination of many account subdivisions, with the further advantage that since labor hours are readily available on a day-to-day basis, this functional breakdown can be kept closely in line with current operations of the utility. A simplification in cost-keeping is also provided when labor hours only are subdivided in great detail, since pricing of many labor items is thus eliminated, and the necessity of distribution of many less important cost items over several account subdivisions is also avoided.

When labor hours are used as a basis of control rather than labor dollars, comparisons with prior periods are not distorted by the changes in average rates. In addition, expression of these functional activities in terms of man hours is readily understood by the operating departments.

V. Conclusion

In conclusion, then, we find that classifications of accounts prescribed by regulatory commissions are not satisfactory in fulfilling the needs of management. The solution suggested in this discussion is a presentation of one manner in which appropriate managerial information could be compiled. The need is a very real one, which we of the accounting departments have well realized for a long time, even though, in some cases, management itself may not have been aware of the progress which can be made along these lines.

We realize that this discussion is necessarily somewhat sketchy, and deals only with some of the general problems involved. For instance, very little has been said of balance sheet accounts, since, of course, operation and maintenance accounts and routine capital expenditures reflect the major informational deficiencies in the regulatory classifications. However, if a departmental classification as outlined here were to be completely developed, the balance sheet accounts, as well as the revenue accounts, would also have to be given careful consideration.

The complete development of the ideas expressed here, as a joint project among member companies, should be very worthwhile. A problem to be met in such a joint venture is that a classification of this sort, to be most useful, must exactly fit the operating organization concerned, and there are wide variations in the organizational setup of different utilities. It may not be too much to hope that a combined effort along these lines might develop classification data which could be presented to regulatory commissions for general adoption.

MANUFACTURERS SECTION

Statement of the General Chairman

By E. L. PAYNE

General Chairman, Manufacturers' Section, Pacific Coast Gas Association

THE resignation of both General Chairman Cliff Menig and Vice Chairman Al Rice in early summer is indicative of the many and unforeseen things which have taken place since our last annual meeting in Del Monte last September. These two able and widely known gas appliance men gave much to our section and the gas industry. Their absence from our counsels we hope will not be long, and that they again may give us of their energies and abilities I am sure is the wish of every member. While they are absent we wish them all good fortune.

This fiscal year has been full of new and never-before-tried regulations, limitations, demands, priorities and all the other effects of the world at war condition which was rearing its ugly head when last we met. Through it all, I am confident our members, in common with our industry in the Nation, have done everything possible to meet not only the letter but the spirit of these innumerable "L," "M" and "P" orders which now control our business. We have exerted, and are continuing to exert, every energy to the end that all possible help of our plants, management and man power be used toward winning the war.

During the year there have been held five Executive Committee meetings and eight division meetings to consider and take care of problems affecting the Section. To the men who gave of their time and expenses, we express our thanks.

One of the problems thus given consideration was the study of Common Labor, the results of which were of much value in preventing an unfair base rate being certified by the authorities in Washington. This study embraced 29 companies, employing 4100 people.

A second study is being conducted by the Water Heater Division which should result in a uniform job classification to cover that division and which gives splendid evidence of leading to a uniform job classification for the entire Section, one which will be in accord with those of the large industries on the Pacific Coast.

At the last annual meeting a resolution was adopted looking to the appointment of alternate directors to sit on A.G.A.E.M. Board. This plan was approved by that body, the alternates were elected, and they have functioned as occasion called. Efforts have been made to contact and work with the Product Divisions of A.G.A.E.M. and to be represented at their meetings.

At the Executive Committee meeting of June 11, unanimous expression was voiced that the A.G.A.E.M. budget should be further curtailed. It was also agreed that interests of Pacific Coast manufacturers would be best served by continuation of the Manufacturers Section of Pacific Coast Gas Association.

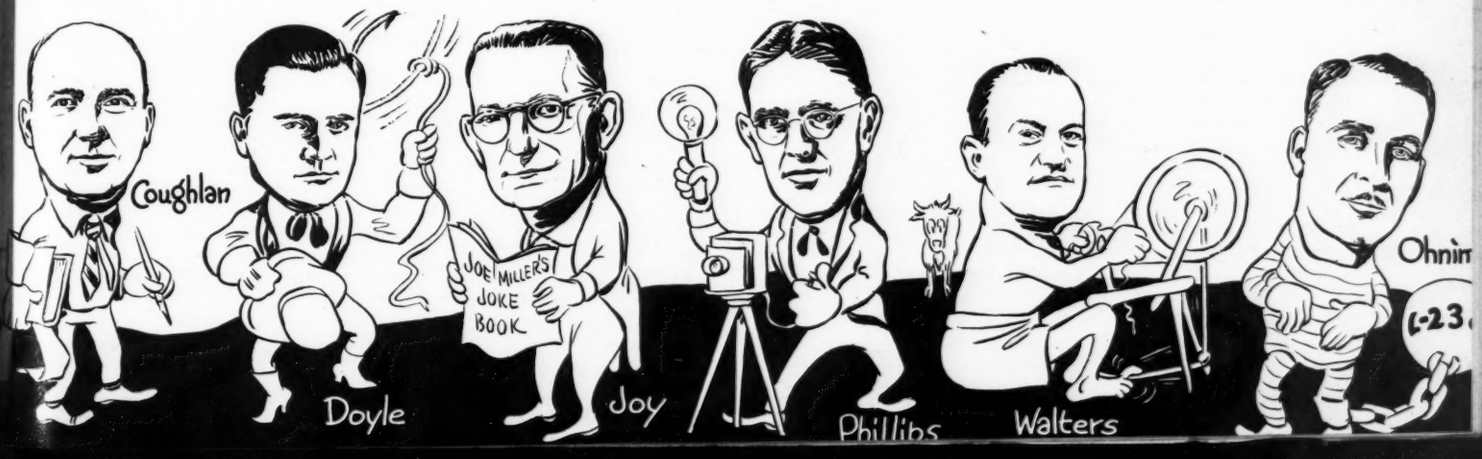
At the first of this calendar year our membership was 70, of which 50 are Coast factories. There have been four casualties since then, a result of war conditions.

Though not a part of the Manufacturers Section, the Los Angeles Laboratory of the A.G.A. is so closely allied with our work that we feel all changes there. War has had its effect there, too, and Herb Vogan, as everyone affectionately calls him, has been loaned to the Cleveland Laboratory for war work. We miss him and hope the war's end is not far away so he may again be with us. Before he left, however, he did a splendid job of training, and we appreciate Fred Allen's pinch-hitting during Herb's absence.

During the past year many things have been proposed, discussed, and ruled upon in Washington Government departments which were vital to our industry. We feel we have been fortunate in that one of our long-time members has found it possible to devote a very considerable amount of time to these important matters directly in Washington and elsewhere in the East. His primary thought in this work was to protect and foster the best interests of the entire gas industry, with special emphasis on the Pacific Coast Section. Mr. Packer's ability, interest and broad acquaintance, and the recognition of the importance of the West Coast in the national picture are all evidenced by his having been appointed by the War Production Board as one of nine from the entire country, comprising the Warm Air Industry Advisory Committee, and one of 19 on the Plumbing and Heating Industry Advisory Committee, incidentally being the only representative of Coast manufacturers in each group.

One matter on which I am sure we all agree—that is the excellent and valued help, cooperation and thoughtful planning given us by both Clifford Johnstone and Carl Swigart.

With the appliance manufacture so greatly curtailed during this all-out war effort, problems we never experienced confront us. One of the most



urgent, perhaps, is what shall be done to assure the ultimate customer of the service due him. Much credit is due at least one company for its recognition of its responsibility along this line. Finding it impossible to continue operating, it arranged with a competitor to acquire necessary patterns and specifications to carry on, advised all of its customers that the competitor would render all service due, and contracted to pay all free service costs monthly. Maybe this is not the best way, but it or some other way which will assure the customer of what is his due will go far to keep gas the popular fuel after this is all over. Any lesser course can only result in the other fuels having been given a fine selling point to our disadvantage.

While the morrow is another's regime, I feel it is only by planning before this meeting ends that we can do those things this coming year which must be done if we are to keep our place in the fuel field. On investigation we find a very small amount of laboratory development being done in our industry. Recognizing the many strains put upon us by the war effort, I still cannot help but feel we must plan for the post-war period. And to do that we must do much laboratory development. To assure this, I would like to recommend that a committee of seven men be appointed to study possibilities, learn what other fuels are planning, advise along what lines new materials, designs and applications of gas must travel if they are to lead the post-war parade. That committee should consist of three from the manufacturers, three from the utilities and one from the Laboratory.

We all want to give of our best to the war effort, win it in a hurry, and get back to the American way of life, but we must do all possible under war conditions to keep existing appliances in safe and efficient working order, and be ready as far as humanly possible when the war ends to give the American public what they deserve, the most useful, attractive energy delivering devices gas has ever known.

P. G. & E. Permitted to Bill Bi-Monthly

Under an order rendered by the Railroad Commission of California, August 11, the Pacific Gas and Electric Co., San Francisco, Calif., was given permission to bill gas customers in rural territories, with certain exceptions, once every two months instead of once a month.

It is expected that the change will save an annual one million miles of auto travel, and relieve a manpower shortage aggravated by 1,100 employees entering the armed forces.

Stating that the application for this suspension of the established rules was made "to conserve rubber tires and man-power during the war emergency," the company listed five points in its petition for the change.

1. For all customers served by the Company in rural territory, except customers for whom orifice type meters are used and any customers whose bills for gas service normally exceed $100.00 a month, gas meters may, at the option of the Company, be normally read at intervals of approximately two months instead of one month.

2. The charge for service rendered in each two-month period will be computed at the applicable filed rate schedule by doubling the monthly service charge, demand charge, or minimum charge, and the number of kilowatt-hours to which each block rate is applicable on a monthly basis.

3. Bills for service supplied during each such two-month period shall be rendered promptly after the close of such period and shall be payable in the same manner as monthly bills heretofore rendered.

4. The Company may at its option, at the end of the first month of any such two-month period, render its bill for service supplied during that month estimated from records of the customer's prior usage and from other available information; and if such estimated bill is rendered, then the bill for the second month of the two-month period shall be the charge for the two-month period computed in accordance with rule (2) above less the amount of the estimated bill for the first month. Both such bills shall be due and payable in the same manner as regular monthly bills heretofore rendered.

5. Where bi-monthly meter reading is established, opening and closing bills and bills for irregular periods will be computed in accordance with Rule and Regulations No. 14, except that periods of 54 to 66 days, both inclusive, will be considered as two months.

Under Item 4 of the proposed emergency rules, the company would have the option, at the end of the first month of any two-month period. to render an estimated bill, thus keeping in effect monthly billing for service rendered. While this procedure, in the opinion of the Commission, would have the advantage of monthly billing, yet it would have the disadvantage of making monthly estimates. It was felt that such a procedure would be somewhat costly to perform and, more important, many disputes between the company and its customers would arise, which would be most undesirable. The Commission believed that at a later time and under more urgent national restrictions, estimated billings might become necessary. At the present time, however, the Commission was of the opinion that the practice of estimated billing should not be used, except in isolated cases and as now used.

■ ■

Pacific-Airmax Corporation Formed by Merger

Helen A. Hartfield, president of Pacific Gas Radiator Co., Huntington Park, Calif., and R. C. Gross, president of Airmax Corp., San Diego, Calif., have announced the merger of their companies under the new firm name of Pacific-Airmax Corp.

"The merger was effected primarily to facilitate and extend the participation of both of the merging organizations in the way of war effort," said Mrs. Hartfield, who continues as chairman and president of the corporation.

All Airmax products will now be manufactured in the fully equipped metal working plant and foundry of the Pacific Gas Radiator Co. at Huntington Park. The arrangement makes it possible to enlarge and speed the production of the essential airplane heating and comfortizing equipment by the Airmax Corp. and the war work already under contract at the Pacific Gas Radiator Co.

R. C. Gross, president of Airmax Corp., has been appointed vice president and general manager of Pacific-Airmax Corp., and A. A. Arnhym, also of Airmax, will be chief engineer. Other officers are Helen C. Wilke, secretary and treasurer; L. M. Hull, sales manager; E. M. Rahm, works manager; and J. B. Marchand, purchasing agent.

■ ■

Meter Association Program Presents B. G. Williams

B. G. Williams, retired gas measurement engineer of the Southern California Gas Co., Los Angeles will be the featured speaker at the September 17 meeting of the Southern California Meter Association to be held at Rio Hondo Country Club. His subject will be, "History of the Development of the Orifice Meter." An eight-member forum on orifice meter practice will round out the program.

The August meeting of the Association featured a paper, "Metering of Oil Well Gross Production," by George L. Paulus, chief meter inspector, Union Oil Co. of California. A motion picture, "The Inside of Arc Welding," was presented through the courtesy of the General Electric Corp. Seventy members attended the meeting.

■ ■

Nine Los Angeles Housing Projects Served by Servel

Nine Los Angeles City Housing Authority projects now under construction will be equipped with Servel gas refrigerators, according to C. A. Miller, regional sales manager of Servel, Inc., Evansville, Ind. The first trainload, totaling 611 refrigerators, arrived several weeks ago.

The housing authority has purchased 2868 refrigerators which will be sent to Los Angeles from the factory in Evansville at the rate of a carload a day.

It takes GAS heat to HATCH EAGLES!

Life in an Eagle's nest isn't what it used to be. The home of Uncle Sam's War Birds, San Diego, has suddenly changed these last two and a half years. With millions of dollars worth of new industries, government establishments and housing units, San Diego has grown, in 1942, to the city it would have been by 1967! We're 25 years ahead of ourselves!

But it takes GAS to hatch eagles! GAS in our aircraft plants is helping turn out planes. GAS in our military establishments is doing its part to help protect our land. GAS in the thousands upon thousands of new homes is keeping war workers healthy, happy, and on the job around the clock!

Providing GAS for these, as well as for the ever-growing needs of our regular customers, is a gigantic task. With 240 of our employees now in the armed forces, those left have assumed the important responsibility of maintaining continuous, uninterrupted GAS service so vital to the armed forces of our country. Are we doing it?

Just ask Mr. Hitler. He knows.

▼

SAN DIEGO GAS & ELECTRIC COMPANY

861 SIXTH AVENUE SAN DIEGO, CALIFORNIA

United Gas Loop Line Authorized

A certificate of public convenience and necessity has been issued to the United Gas Pipe Line Co., Shreveport, La., by the F. P. C. for construction and operation of a 38-mi. 12¾-in. natural gas pipe line to loop present lines from the Lake Long Field in southern Louisiana to a point near St. Rose where it will connect with the company's Baton Rouge-New Orleans Line. Application for authority to construct the new line was filed by the company on June 19, 1942, pursuant to Section 7(c) of the Natural Gas Act, and a public hearing was held in the matter on August 3. The cost of the line is estimated at $1,000,000.

Reason for the construction is that United has received notice to increase its maximum daily delivery to New Orleans Public Service, Inc., from 86,000 M c. f. to 135,000 M c. f., and to Louisiana Power & Light Co. from 25,000 M c. f. to 48,000 M c. f. not later than December 15, 1942. These increases in demands are made necessary by the National War Program, as well as the general development in the New Orleans area.

The War Production Board authorized the Applicant's proposed construction of the Lake Long loop line, the conversion of the Baton Rouge-New Orleans line to a high-pressure pipe line and assigned preference ratings for necessary materials August 12.

The authorization is subject to three limiting provisions: (1) that issuance of the certificate is without prejudice to the authority of the Commission with respect to other proceedings; (2) that construction of the line shall conform to provisions of the Natural Gas Act and applicable State Laws; and (3) that the certificate shall not be transferable except upon express approval of the Commission.

Underground Gas Storage Advocated

DESIGNED to meet the problem of winter peak loads exaggerated by war production demands, the California Railroad commission has announced a plan to utilize the 240 acre Playa Del Rey depleted oil field near Venice, Calif., for the underground storage of surplus summer gas production. The gain in population and the increased demand for gas by war industries is threatening a serious shortage in the Los Angeles area during the coming months. Estimated peak demand in the winter is seen as 568,000,000 cu. ft. daily, with the available facilities yielding only 552,000,000 cu. ft. daily. Standby plants can produce 100,000 additional cu. ft. daily, but these are needed to equate the hourly demand.

Under the plan proposed by the Commission, the federal government would take over the Playa Del Rey field and arrange for surplus gas from the other fields in California to be pumped into the underground reservoir. It is estimated that if this plan were followed in the remaining warm months, sufficient gas would be accumulated to permit daily withdrawals of 20 to 25 MM c. f. daily during cold spells.

An arrangement is contemplated that will permit the Union Oil Co., Los Angeles, Calif., owner of about half the field, and some 200 small lease and royalty holders to participate in any profits from oil recovered when the gas is withdrawn. Estimates place the value of the oil remaining in the field now at about $500,000, with the possibility of greater yield as a result of the repressuring operations.

Little trouble with priorities for equipment is expected, since most of the materials and compressors needed are already in the possession of cooperating companies.

■ ■

President Roosevelt Appoints Special Rubber Commission

Confusion in the public mind over the rubber situation in the nation will be clarified, it is hoped, by a special committee appointed Aug. 6 by President Roosevelt to study the several proposed programs for making synthetic rubber, especially that of using grain alcohol in addition to, or instead of, petroleum products.

The committee consists of Bernard M. Baruch, Dr. James B. Conant, president of Harvard University, and Dr. Karl T. Compton, president of Massachusetts Institute of Technology.

■ ■

Community Natural Gas Co. Installs 350 New Services

The influx of workers in war defense industries in the Grand Prairie area between Dallas and Fort Worth, Texas, has occasioned the installation of more than 1550 new services in that district by the Community Natural Gas Co., Dallas, Texas, since July, 1940. The most recent additions totaled 350 complete gas services for new homes in a recently opened outlying residential development southwest of Grand Prairie.

Two Fields Tied in to Relieve Gas Shortage

To remove possibility of a natural-gas shortage in the Grand Rapids, Mich., area, the Public Service Commission of Michigan announced approval of a plan to link two fields. The commission authorized Michigan Consolidated Gas Co. to build an 18-mi. pipe line linking the Six Lakes field in Mecosta and Montcalm counties and the Mecosta County Austin field. Grand Rapids has been getting its gas from the Six Lakes field while the Austin field supplies Muskegon, Mich. Six Lakes pressures are reported falling and as Grand Rapids uses twice as much gas as Muskegon it is planned to tap the Austin field, if necessary, where reserves are estimated at three times more.

Leslie T. Barber, of Edmore, Mich., has asked the commission for permission to build and operate a new line to serve the new Winn gas field in Isabella County Michigan. Mr. Barber wants to build an 8-mi. 3-in. line to Edmore to link with pipes lines of Consumers Power Co.

■ ■

New Feeder Line Built At Cost of $100,000

The San Diego Gas and Electric Co., San Diego, Calif. has a 3½-mi. 12-in. loop line under construction at an estimated cost of $100,000. The line will run from Old Town to Hillcrest by way of Mission Valley Road. The line is electric welded, will operate at a maximum pressure of 400 lb. per sq. in. with a maximum capacity of 24 MM.c.f. daily, and is equipped with cathodic protection. Completion is expected by November 1. The line is to serve as an additional feeder to the Hillcrest and East San Diego districts from the 16-in. transmission line in Old Town, and from the Station A gas distribution center to National City, Chula Vista and the company's new steam-electric generating station. National Tube Co., Pittsburgh, Penn., supplied the pipe, and Merco-Nordstrom Valve Co., Pittsburgh, Penn., the valves.

■ ■

Lone Star Builds Line for Community Natural Gas Co.

Construction of a 6-in. high pressure gas pipeline from San Angelo to San Angelo Army Flying Field No. 2 is under way by the Lone Star Gas Co., Dallas, Texas, for the Community Natural Gas Co. Lone Star is building the line for Community Natural because of equipment which Lone Star has available for such construction. Luther Tolbert, assistant superintendent of pipeline department, from Dallas, is in charge of the work. E. L. Buelow, San Angelo Division superintendent for Community Natural Gas Co., said the line would be completed by early fall. Around 200 men are now employed on the job. Estimated cost of the work is in excess of $50,000.

■ ■

Cheese Maker Uses Gas

N. Y. Yordi's new cheese manufacturing plant recently opened at Mountain View, Okla., will use natural gas for generating steam to pasteurize the milk and for other operations, according to R. K. Osborn, president of the State Fuel Supply Co., Oklahoma City, Okla. The company supplies about 20 towns, mostly located in western and southwestern Oklahoma, with natural gas distribution and transmission services and encourages these commnuities to secure small local manufacturing plants to utilize farm products or other raw materials.

More than ever

Guns ★

Airplanes

Ships

★ ★

SOUTHERN COUNTIES GAS COMPANY

SOUTHERN CALIFORNIA GAS COMPANY

NU-WAYS

Small Diameter Earth Boring Equipment

J. D. Staples, Southern California Gas Co., Los Angeles, excerpts from a report on "Small Diameter Earth Boring," presented before the Spring Technical Conference, Pacific Coast Gas Association, Los Angeles, May 21-22.

An interesting and practical use of small boring equipment is the development of its use in forming pilot holes for large diameter bores where continuous auger or other large type boring equipment must be utilized. See Fig. 1 below.

The method employed is to bore first with the small equipment to the desired termination point. The small bore shaft is then left in place, subsequently being welded to the point of the large auger, thus forming a continuous pilot throughout the length of the bore. The small bore shaft is removed at the termination point as the bore progresses. In all cases reported where this method was used, the larger bores were completed with a greater degree of accuracy than had previously been experienced.

The utilization of light, portable gasoline powered tools for making wet bores has come into rather general use. This equipment is proving to be a very practical and valuable asset. The operating and maintenance cost is very low. Machines used daily have completed several months of service without breakdowns. Very close attention to lubrication is probably the primary factor in gaining these results.

There has recently been developed a carriage (Fig. 2) for one of these gasoline units which makes it possible, in many instances, for one man to perform the boring operations without help. This device is simply a wheelbarrow frame with rubber tired wheel upon which the gasoline unit is mounted with the boring shaft toward the front. The operator then controls the bore by handling as he would a wheelbarrow. He has complete control of the shaft torque and thrust at all times. Thus when the bit strikes a buried object or tends to bind, it is felt by the operator immediately. To correct, he simply pulls back on the machine slightly, which allows the shaft to rotate freely, and thus prevents the motor being stalled or possible damage to a substructure.

FIG. 2. Carriage for gasoline boring motor.

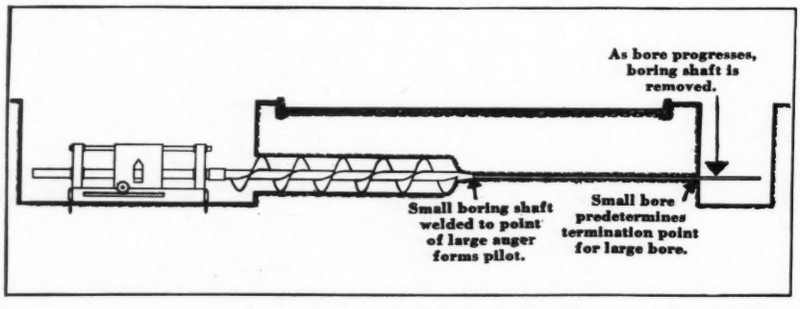
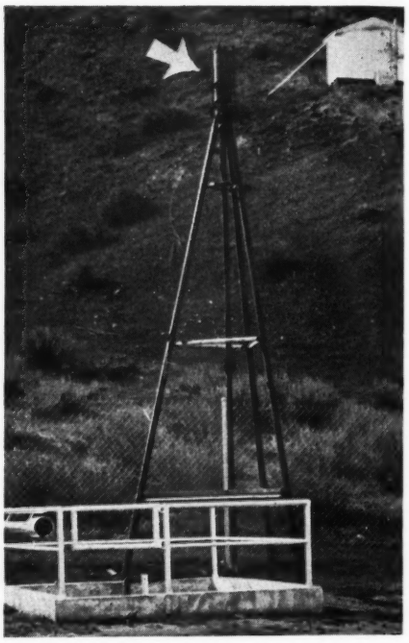

As bore progresses, boring shaft is removed.
Small boring shaft welded to point of large auger forms pilot.
Small bore predetermines termination point for large bore.

FIG. 1. Sketch of pilot bore for large auger.



Air Raid Whistle

This whistle is a cylinder 8 in. in diameter, 2½ in. long, with a plunger that when raised or lowered changes the pitch and tone. It is mounted on a 2½-in. pipe tripod 20 in. high and is operated by gas pressure from a 12-in. transmission line 100 ft. from the blow down connection of the valve set-up. Normal pressure in the transmission line is 210 lbs. During blackouts or possible air raids, this whistle serves a nearby community and outlying ranches as well as the traffic on a considerable stretch of an adjacent highway as a warning siren. It is operated by a gas company employee on duty in this area. This whistle was developed and installed by the Southern California Gas Co., Los Angeles, Calif.

■ ■

Fixed Orifice for Slow Light Testing With Air

W. J. Henning, United Gas Corp., Houston, Texas. Presented before the Southwestern Gas Measurement Short Course at Norman, Okla., April 21-23.

With the use of air instead of gas as a test medium, rubber stoppers can be substituted for regular meter connections. The inlet stopper is fitted with a short piece of ⅛-in. copper tubing which connects to rubber hose on air supply manifold. The outlet stopper is fitted with a short piece of ⅛-in. copper tubing closed on one end, with a hole drilled in center, using a No. 78 drill which will pass approximately ½ cu. ft. of air per hour. This method eliminates the necessity for using connections for slow light tests and has proved to be a very rapid as well as safe method.

Southern Gas Association Cancels 1943 Convention

POSTPONEMENT of the annual convention scheduled for February of 1943 has been announced by the officers and directors of the Southern Gas Association, Fayetteville, Ark., after careful consideration of all the factors of time, transportation and expense had been considered. In making the cancellation known, L. B. Denning, Jr. president stated:

"We realize, of course, that our annual convention has in the past been a very important means of maintaining interest in the association and in the association's activities, and we have hesitated in making a definite decision to postpone this year's convention because we feared that such a postponement might result in lagging interest on the part of the membership. We feel that the functions and activities of the association should be carried on without interruption.

"An Executive Committee meeting will probably be held sometime in September. At this meeting we hope to develop plans which will keep the association alive and active during the period when it is impractical to hold conventions."

■ ■

FPC Resumes Hearings on Proposed Rate Increase

The Federal Power Commission announced that hearings were resumed August 31 in Washington, D. C., on a proposed increase in the rate charged for the interchange of natural gas between New York State Natural Gas Corp. and Allegany Gas Co. The rate schedule providing for the increase, filed with the Commission by the New York company on March 26, 1940, was suspended pending hearings in the matter. The hearings began on July 8, 1940, and were adjourned two days later. The company, on May 19, 1942, filed a motion to make the suspended rate schedule effective.

The proposed increase, according to the contract filed with the Commission, is from 40 cents to 45 cents per Mcf and covers emergency supplies of natural gas which are interchanged between the two companies. Pipe lines of the Allegany and the New York companies cross at several points and both transport and sell wholesale.

■ ■

Wisconsin Utility Achieves High Safety Record

Wisconsin Public Service Corp. employes of Green Bay and De Pere have completed a year and a half of work without one lost time accident in gas, electric and bus department operations. With 280 employes in the Green Bay division, the record is equivalent to more than a million man hours without an accident preventing the continuation of work. During recent years the company has received one first, two second, and one fourth place in the annual National Safety contest held for combined gas and electric companies throughout the U. S.

■ ■

Desulphurized Arkansas Gas Powers New Electric Plant

In the near future commercial use of the "sour" gas produced in the McKamie field, Lafayette County, Ark., will be made to supply primary energy to the new electric generating station now being built by the Arkansas Power & Light Co. at Stamps, near the field. Gas will be processed through the new desulphurization plant being built by Carter Oil Co. and Atlantic Refining Co.

Statistics on Public Utility Accidents for 1941

REARRANGING the figures to eliminate all data that might supply information of value to the enemy, the National Safety Council has recently released its annual statistical report on accidents in public utilities for 1941. Included is a comparison between the record made by public utilities and industry as a whole. It shows that public utilities' industrial accidents were only up 7% over the 1940 totals in frequency compared to 8% of all industry in 1941, and the severity was a —76% for public utilities as compared to only —67% for all industry.

Of all public utilities, natural gas companies turned in the best accident reports. Natural gas companies reduced the frequency rate —3% in 1941 as compared to 1940, and cut the severity rate by a —28%. This compares with an overall utilities report of plus 7% in frequency and a —11% in severity.

Summarizing the most important facts revealed by the survey, the National Safety Council lists 11 outstanding points as follows:

1. The 1941 injury experience of public utilities was based on the records of 696 companies—the largest coverage ever reported to the National Safety Council.

2. The average frequency rate for all public utilities was 12.53 reportable injuries per million hours worked or 18% below the general average for all industries.

3. Severity rates averaged 1.54 days disability per thousand hours worked—almost equal to the average for all industries.

4. Public utilities had slightly better results in comparison with 1940 than did American industry as a whole. Frequency rates increased 7% on the average, but severity rates averaged 11% lower.

5. Net reductions in injury rates since 1926 were 76% for frequency and 71% for severity. Improvement in each rate has been considerably larger than the reductions by most industries.

6. Large companies had the lowest 1941 injury rates, averaging 11.94 for frequency and 1.37 for severity.

7. Small organizations had the highest injury rates and also the largest increases in both rates from 1940.

8. Telephone and telegraph companies had the lowest frequency rates, averaging 5.12, and natural gas companies had the lowest severity rates, averaging 0.82.

9. Only natural gas companies made reductions in both injury rates in comparison with 1940.

10. The biggest safety problem in the industry is the prevention of fatalities in electrical operations. One in 33 reportable injuries in the electrical industry was a death during the past five years in comparison with one in 132 for gas companies and one in 98 for American industry as a whole.

11. The Fall River Electric Light Co., Fall River, Mass., holds the best all-time no-injury record—4,337,640 man-hours.

The best feature in the 1941 experience in public utilities was the reduction of 11% in severity from 1940. This decrease was larger than the average for American industry as a whole. While frequency rates were generally higher in manufactured gas, electrical and other utilities, the average increase of 7% was in line with changes in most industries.

The improvement in severity was mostly due to sharply lower rates in natural and manufactured gas utilities. Their reductions averaged about 26% in comparison with only 2% for electrical utilities.

■ ■

Conservation Experiments In Texas Show Promise

HEARINGS conducted before the Texas Railroad Commission's oil and gas division in recent weeks indicate that success has attended the latest venture by the industry to achieve greater conservation of gas supplies.

The program which has been experimental is one seeking to place a check upon those wells whose oil production was attended by excessive gas production by transfer of allowables to wells which were moderate in gas used. First experiment was made in the Goldsmith field, in West Texas, commencing last May. Proponents of the plan agree that elapsed time is insufficient yet to make possible any truly accurate estimates, but hold that there is reason to believe that savings of upwards of 5 billion cu. ft. of gas will be possible.

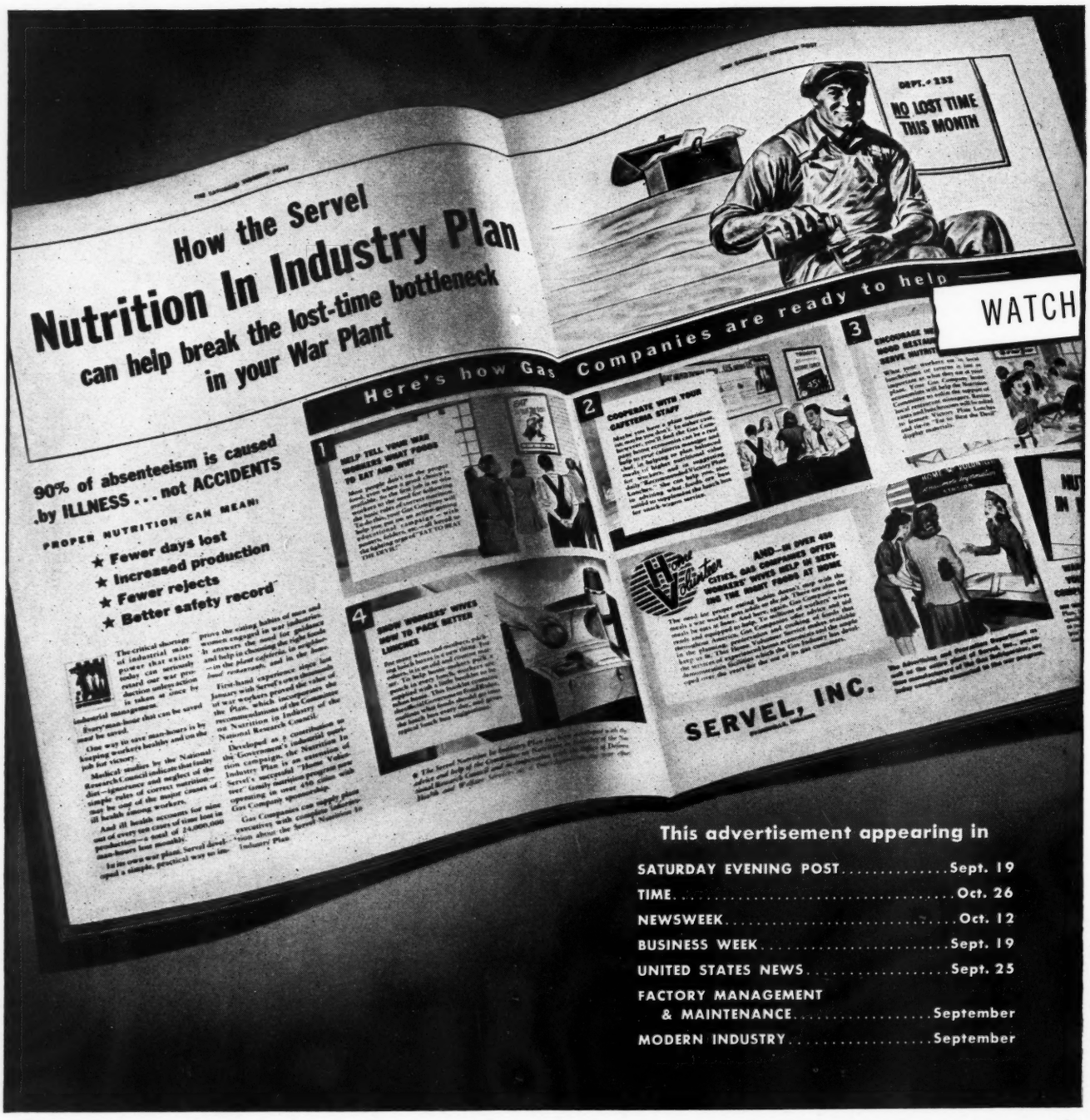
Under the plan the field is divided into units of 320 acres each, with a well for each 10 acres. Some of these would be excessive gas users, or "high gas-oil ratio" wells. Up to half of the producers could be closed in, the allowable for the tract then taken from 16 chosen wells. Following the inauguration of the Goldsmith experiment, operators requested that similar provisions be allowed in the Estes field, likewise in West Texas. It has been held that the total allowable can be produced with gas consumption halved. The commission now is considering requests for extension of the plan to three other large fields.

Short A. G. A. Meeting

With the first day devoted to section and committee meetings — Natural Gas Section in the morning, all other sections in the afternoon and evening of the same day—and the second given over to general sessions, the abbreviated annual meeting of the American Gas Association will be held October 5-6 in the La Salle Hotel, Chicago, Ill.

Programs of the sessions, with the exception of business prescribed by the association's constitution, will be limited to discussion of war and post-war problems. The program has not been set definitely, since constant revisions are being made in the topics to keep them up to date. All entertainments have been cancelled in line with the war convention policy of business only.

Spreading the news NUTRITION IN

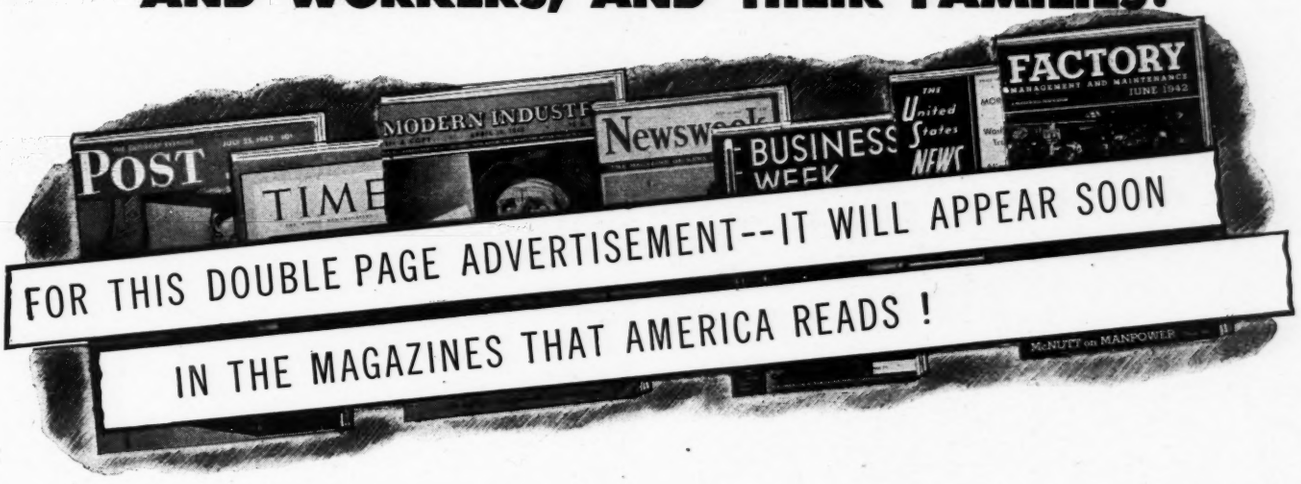

How the Servel
Nutrition In Industry Plan
can help break the lost-time bottleneck
in your War Plant
DEPT. of 232
NO LOST TIME THIS MONTH
WATCH
Here's how Gas Companies are ready to help
90% of absenteeism is caused by ILLNESS . . . not ACCIDENTS
PROPER NUTRITION CAN MEAN:
★ Fewer days lost
★ Increased production
★ Fewer rejects
★ Better safety record
1 HELP TELL YOUR WAR WORKERS WHAT FOODS TO EAT AND WHY
2 COOPERATE WITH YOUR CAFETERIA STAFF
3
4 SHOW WORKERS' WIVES HOW TO PACK BETTER LUNCHES
AND—IN OVER 450 CITIES, GAS COMPANIES OFFER WORKERS' WIVES HELP IN SERVING THE RIGHT FOODS AT HOME
SERVEL, INC.

This advertisement appearing in

SATURDAY EVENING POST	Sept. 19
TIME	Oct. 26
NEWSWEEK	Oct. 12
BUSINESS WEEK	Sept. 19
UNITED STATES NEWS	Sept. 25
FACTORY MANAGEMENT & MAINTENANCE	September
MODERN INDUSTRY	September

about the
INDUSTRY PLAN

TO AMERICA'S WAR PLANT MANAGERS AND WORKERS, AND THEIR FAMILIES!



MILLIONS OF PEOPLE—plant managers, war workers, men and women in industry and their families—will read this message . . . the first public announcement of Servel's Nutrition In Industry Plan!

This dramatic double-page advertisement will appear in the September and October issues of leading American magazines . . . at a time when Gas Companies everywhere will be doing their utmost to carry forward this program!

Already the Nutrition In Industry Plan is gaining momentum. More and more experts are realizing that poor nutrition and illness are slowing down our war effort. Recently the Government announced a major drive for manpower conservation through proper industrial nutrition. The Servel Plan will enable Gas Companies to continue their vital nutrition work . . . and support the Government drive quickly and efficiently.

The value of proper diet among war workers cannot be overestimated! It will mean millions of man-hours gained in the battle of production . . . more ships, guns, tanks for our fighting forces. That is why the Nutrition In Industry Plan is an excellent opportunity for every Gas Company to serve its customers . . . *and* its country!

SO DO THIS TODAY: Get in touch with your local, Government-approved Nutrition Committee. Tell them about Servel's Nutrition In Industry Plan. Then determine how this Plan may be applied to the war plants in your own community.

SERVEL, *Inc.*

PEACETIME MANUFACTURERS OF THE SERVEL GAS REFRIGERATOR

WINS GOOD WILL FOR GAS AND GAS SERVICE

Oil Commission to Meet in Chicago

WIDER recognition of the importance of natural gas as an element in the manufacture of many products necessary for maintenance of the economic structure and the war effort in the United States will be given by the Interstate Oil Compact Commission in its autumn meeting set for October 1-3 at the Palmer House in Chicago.

Studies and reports at the coming quarterly meeting in Chicago will not only include comprehensive reports, state by state, on previously adopted and recommended methods of conserving the nation's natural gas supply but its multiple uses other than as a fuel, will be explored by experts. These will include the experiences of America's chemists and manufacturers in making synthetic rubber, explosives, plastics, textile fibres, solvents, ammonia, anesthetics, fruit essences, perfumes, dye stuffs and many other essential and indispensable products from natural gas. Speakers now being chosen and committees now making investigations will show, not only the value of gas in repressuring of oil fields and in production of a long list of synthetics, but its value as the cleanest and most economical fuel.

The research and coordinating committee, F. V. L. Patten of Texas, chairman, Dan O. Howard, of Oklahoma, vice chairman and E. G. Dahlgren of Oklahoma City, technical secretary, will present the report at the Chicago meeting on the uses and conservation of natural gas. The legal committee, Earl Foster of Oklahoma City, chairman, will also present a report on laws and regulations, including proposed legislation, national and state, to promote further conservation of gas. Federal representatives will appear on the program.

The interstate oil compact commission is composed of representatives of 12 states. Governor Leon C. Phillips of Oklahoma, is chairman.

■ ■

Natural Gas Helps to Solve Tool Rehabilitation Problem

Facing the double problem of operating three shifts at a time when the supply of tungsten carbide tipped tools was dwindling, Reliance Electric and Engineering Co., Cleveland, Ohio, devised a method of salvaging and rehabilitating both those tools in current use and a large number of worn tools that had accumulated over a period of 10 to 12 years. Natural gas is credited with an assist in the necessary brazing of new points on old tool shanks.

In doing the work, the only new equipment needed was a brazing furnace which was designed and built in the company's shops. It uses six fish tail gas tips, three on each side of a furnace hearth which is provided with a hinged and heavily insulated hood. Natural gas mixed with air in a predetermined ratio in two manifolds, one for each set of three burners, produces so hot a flame that the largest tool shank handled, 1¼ in. square can be heated cherry red in about 1½-min.

■ ■

Empire Southern Gas Co. Buys Wildcat Oil Well

Empire Southern Gas Co., Big Spring, Texas, has purchased from R. M. Coleman, Fort Worth, Tex., the wildcat gas well recently completed 5 mi. south of Santa Anna, Coleman County, Texas. The purchase includes the surrounding leases, which will serve to provide an additional gas reserve for the company's gas system. The well is estimated good for 1,200,000 cu. ft. of gas daily.

■ ■

Large Gasser In New York

The Belmont Quadrangle Drilling Corp. has announced the drilling of a 16,000,000 cu. ft. gasser on the George Lewis farm in Steuben County, N. Y.

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Well Spacing Regulations Revised in Smackover Field

An exception to well-spacing regulations, which will enable operators in the Smackover oil field in southern Arkansas to plug back wells to shallower producing horizons, was granted in August by the Director General for Operations, War Production Board, on recommendation of the Office of Petroleum Coordinator for War.

Under the field-wide program of action now possible, the producing lives of many wells will be prolonged and the ultimate recovery of oil from the field increased.

The authorization contained in Supplementary Order M-68-4, does away with the necessity for each operator applying individually for an exception to Conservation Order M-68 to permit the use of materials required for recompletion operations. As more than 3,700 wells had been completed in the Smackover field by the end of 1941, this procedure would have involved considerable delay and expense, as well as some loss of production.

The application for a field-wide exception to M-68 was initiated by the Arkansas Oil and Gas Commission. It is the first case on record in which a State agency has held a field-wide hearing, assembled evidence, and then prepared an application for exception in behalf of all the operators in a field. The Office of Petroleum Coordinator strongly favors such procedure wherever practicable.

The Smackover field covers an area of some 29,500 acres in Ouachita and Union Counties, Ark. It has been producing since April, 1922. Original recoverable reserves of oil were estimated at 423,000,000 barrels. Approximately 389,304,000 barrels had been produced by January 1, 1942.

■ ■

S. E. C. Orders Dissolution Of Utility Holding Group

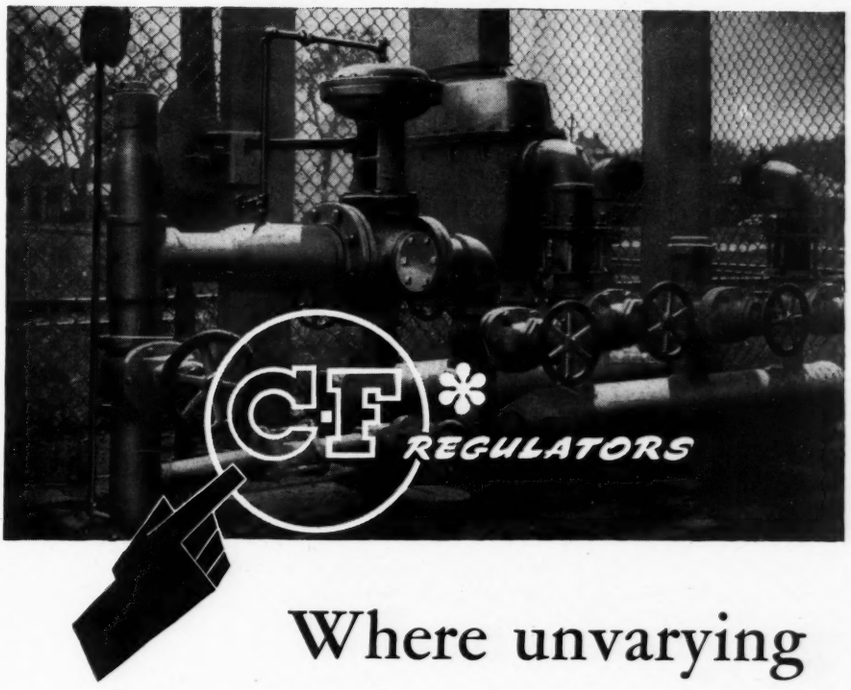
Dissolution of the American Power and Light Co. and Electric Power and Light Co., major units of the Electric Bond and Share Corp. system, New York City, has been ordered by the Securities and Exchange Commission under section 11(B) (2) of the Holding Company Act in 1940. The S. E. C. rejected the companies' contention that plans of reorganization already filed were a bar to the entry of the dissolution order and asserted that "nothing contained in these plans . . . is calculated to impart a useful function to these companies."

The S. E. C. asserted that Bond and Share utilized American and Electric as pyramiding devices to control the two subsidiaries system with a disproportionately small investment and thus the voting power and security holders were unfairly and unequably distributed. Control of the two sub-holding companies is effectuated, the Commission said, through Bond and Share ownership of securities which represent an interest of only 3.42% of the total capitalization of American subsidiaries, and of 8.27% of Electric's capitalization.

■ ■

Seventeen Texas Schools Converted to Gas Heating

After a year's trial period the Waco school board has adopted natural gas central heating for all 17 school buildings in Waco, Texas. Waco is served by the Texas Cities Gas Co., Dallas, Texas, whose representatives made good their estimate of a $2000 saving in fuel costs annually with natural gas during the one-year trial period and thereby won approval for the permanent use of natural gas in all the school building units.



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ABSTRACTS

• **ABSTRACTS of papers presented at the Pacific Coast Gas Ass'n Spring Technical Conference, Los Angeles, Calif., May 21-22, 1942.**

Internal Corrosion of Gas Dehydration Equipment by Calcium Chloride Brine—N. K. Senatoroff, Southern Counties Gas Co., Los Angeles. This paper represents a continuation of an investigation started a few years ago and deals primarily with field observations of internal corrosion in a natural gas dehydration contactor, in which concentrated calcium chloride brine was used as the absorbent.

Mitigation of Corrosion at Calcium Chloride Dehydration Plants—B. M. Laulhere, Southern California Gas Co., Los Angeles. Southern California Gas Co. has operated two calcium chloride gas dehydration plants in the Belridge Oil Field, California, continuously since 1937. Throughout this period of operation corrosion has been encountered, resulting in general deterioration of the plants and causing difficulty in the maintenance of control equipment. Variations in the method of operation, to the extent possible without major redesign, produced no measurable relief. A parallel field and laboratory corrosion study was also conducted, for the purpose of obtaining information on the corrosion processes involved, which might assist in their control. These studies indicated that the corrosive influences are oxygen (air), carbon dioxide, hydrogen sulfide and their combinations, with oxygen the most potent factor. Chemical inhibitors were also investigated.

Oxygen (air) was introduced into the system through the brine evaporator or concentrator, which consisted essentially of a steam heated coil over which the brine trickled, the evaporated water being swept away as steam by a current of air induced by a stack effect; this operation promoted continuous solution of air into the brine.

To exclude air from the brine, the evaporator unit has been redesigned as a closed system. Essentially, it consists of a series of steam heated tubes over which the brine circulates slowly and is heated to a thermostatically controlled temperature of approximately 270° F. The unit is enclosed and vented to the atmosphere, steam being expelled continuously by virtue of the vapor pressure produced. Concentrated brine flows to the surge tank (also enclosed) and is returned to the contactor pump.

One of these new evaporator units has been installed and in operation for approximately one month. While it is too early to definitely appraise the results of this change, indications to date are encouraging in that no rust appears in the circulating brine.

The Development of a Procedure for Testing Flue Cowls—P. W. McDonald, Southern California Gas Co., Los Angeles. In 1941 a paper was presented at the Pacific Coast Gas Association Annual Convention on "Methods and Specifications for Testing Vent Cowls." It presented for discussion the results of preliminary tests conducted in an attempt to establish standard methods of test and minimum specifications which would be satisfactory for all flue cowls. During the past year test work on this project has continued. Two methods of test relative to performance requirements have been investigated, namely (1) tests using forced draft and (2) tests using natural draft. This paper presents the results of this work to date.

Air Openings to Furnace Rooms—C. W. Pollock, Southern California Gas Co., Los Angeles. In this paper the results of an investigation, conducted by reducing the air openings to the furnace room and noting the effects on venting and combustion, are presented. The test work was conducted at the warm air heating research residence maintained by the Southern California Gas Co. and the Southern Counties Gas Co. of California, using a forced air furnace, the furnace fan taking the circulation air from a source other than the furnace room.

The results of the investigation indicate that even though the combustion of this particular furnace was satisfactory with only a minimum of air openings to the furnace room, a condition is created that is unfavorable to good combustion and/or venting and furthermore the temperature of the furnace room becomes excessively high when the air openings are inadequate.

Warm Air Heating Research—C. W. Pollock, Southern California Gas Co., Los Angeles. This paper presents a discussion of the work conducted to date on a warm air heating research program undertaken by the Southern California Gas Co. and the Southern Counties Gas Co. of California as an activity of their gas appliance laboratory.

The object of this program is to investigate the heating characteristics of a typical house with typical furnace installations under actual weather conditions. Thus far in this work, emphasis has been placed on furnace sizing data using a gravity furnace and a forced air furnace, and a comparison of fresh air operation versus recirculated air operation using the forced air furnace.

The investigations on the subject of furnace sizing include such items as (1) an analysis of Los Angeles temperature trends for the past 64 years, (2) the effect of opening and closing the fireplace chimney on the heating rate during the warm-up period, and (3) a comparison of fresh air operation versus recirculated air operation during the warm-up period.

In the maintenance operation tests conducted to investigate the economy of fresh air operation versus recirculated air operation, the observed heat requirements for the house in one instance were 65% in excess of the observed requirements for another test having the same average outside temperature and using the same method of operation, which is a far greater variation than would be expected on comparing the two different

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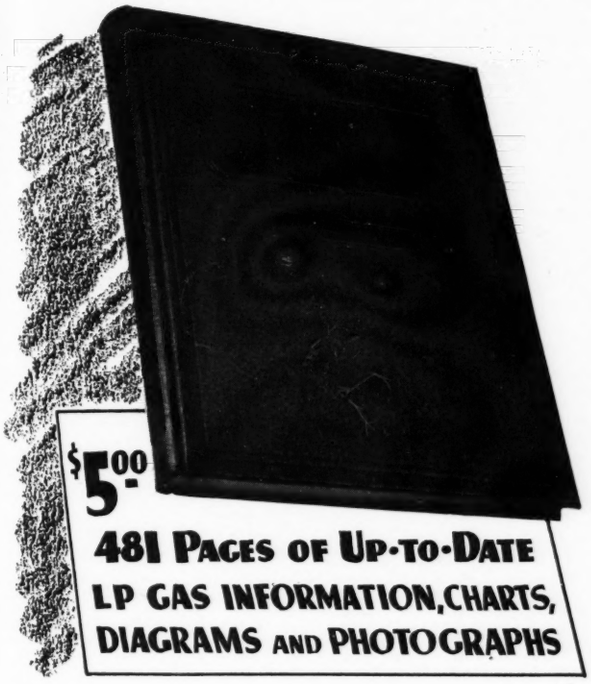

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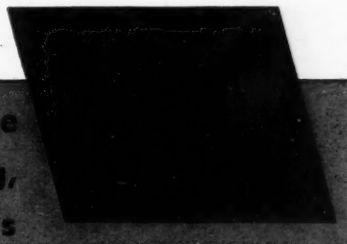

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methods of operation. An investigation of the factors affecting this variation in B. t. u. input on different nights having the same average outside temperature indicates that some correlation exists between the heat requirements of the house and the changes in humidity and cloudiness, probably explained by the variation in radiation losses from the house to the sky.

Progress Report on the California Natural Gasoline Association's Gas Measurement Committee's Work to Establish Superexpansibility Factors Covering the Pressure Range of 500 to 1000 Pounds Per Square Inch—J. T. Cortelyou, Southern California Gas Co., Los Angeles. One of the prime needs of natural gas measurement in California is the extension of the superexpansibility factors as set forth in the California Natural Gasoline Association's Bulletin TS354, to cover the pressure range of from 500 to 1000 lbs. per sq. in. Both the Gas Measurement Committee of the California Natural Gasoline Association and the Large Volume Measurement Section of the Pacific Coast Gas Association are vitally interested in accomplishing this task.

Inasmuch as the manpower available for such purposes is somewhat curtailed due to the national emergency and because the California Natural Gasoline Association's committee had already begun the work, the latter group has decided that it would be most desirable to follow the work of the former group. This is a progress report of the work to date of the California Natural Gasoline Association's efforts toward developing these factors.

While the work itself is perhaps less than one-third completed, the method of attack has been pretty well established.

During the last two years there has been much published data correlating a value, Z, with reduced pressure and temperature. Z can be readily converted into Y and F*pv*, the superexpansibility factor. Reduced pressure and temperature are the ratio of actual to critical pressure and/or temperature.

Thus, if the critical pressure and temperature of a gas are known, its F*pv* can be determined as a function of the pressure. The Gas Measurement Committee is devoting its efforts toward correlating critical pressure and temperature with specific gravity. When this is done, F*pv* can be determined as a function of pressure, temperature, and specific gravity; and tables can be prepared.

Field Installation Experience With Somastic Coatings—Allison B. Polley, Pacific Lighting Corp., Los Angeles, Calif. Somastic pipe protective coating is a mechanical mixture of 13% asphalt, 1% asbestos, 62% sand, and 24% mineral filler; the percentages referred to are by weight. This mixture at a temperature of from 375° to 400° F. is applied in a semi-molten state to each joint of pipe as a continuous, seamless coating. A section of the pipe at each end of each joint is left bare to permit field welding; the length of these bare sections depends upon the size of the pipe. A coat of whitewash is applied over the Somastic which serves a threefold purpose. It prevents the coating from bonding to another surface, it makes any damage to the coating readily discernible, and in warm weather construction reduces the amount of heat absorbed. The ½-in. thick coating applied to 10¾-in. pipe adds approximately 17 lbs. per ft. to the weight of the bare pipe. However, the thickness of the coating can be slightly varied to the owner's desire. This is of particular benefit if additional protection is thought necessary or if slight additional weight is needed, such as to overcome the buoyancy effect in a stream crossing.

The Central Tool Depot System—L. L. Biggs and J. R. Brick, Southern California Gas Co., Los Angeles. In the Southern California Gas Co., all functions pertaining to tools are centered at the central tool depot. The paper describes the depot and details its system of operation.

A comparison is drawn to show differences existing between conventional accounting *of* tools from the accountant's point of view and accounting *for tools* as concerns the individual in an operating department. Beneficial results of the exercise of this concept are shown in a reduction of tool expense, provision of better tools, and facilities for the development of ideas.

The physical set-up of the depot is detailed together with reasons for its arrangement. Personnel and their duties are explained. Repair facilities are considered from the standpoint of four arbitrary categories of tools, *i. e.*, large tools, small tools, welding equipment, and electrical tools.

The purpose, scope, and general description of the tool catalog are discussed and its procedure of preparation and reasons for being are explained.

Modern Meter Proving Rooms and Methods—E. M. Cloran, Pittsburgh Equitable Meter Co., Pittsburgh, Pa. This paper covers in a general manner the trend apparent in the last few years to modernize and improve meter shop methods and equipment, particularly the proving room. Detailed account is given of developments in the writer's own company, the Pittsburgh Equitable Meter Co.; the factors of improved accuracy and production efficiency are discussed and equipment and methods used to accomplish this are examined and explained by means of illustrative photographs and diagrams. Also, the relation of meter assembly operations to proving is examined and new tests devised for improving meter performance are shown.

Water Treatment for Industrial Plants—D. R. Hiskey, Dearborn Chemical Co., Chicago, Ill. A discussion of boiler waters, their treatment and control. The tests described are used extensively throughout the country by plant operators and manufacturers of cooling and boiler equipment as well as manufacturers of water treating chemicals. Presents a few simple tests which will enable a plant operator to check periodically the water being used. It is understood that when a new plant is put in operation, that all available water has been thoroughly tested by laboratory methods, enabling the selection of a suitable type of water treatment. After this has been done, then by the tests described, an operator will be able to know the condition of the water he is using and as a means of checking any trouble by an upset in the balance of treatment. In this manner he will prevent deterioration to plant equipment and reduce shutdown to an absolute minimum.

Protective Measures for Transmission Facilities—Carl D. Merritt, Pacific Lighting Corp., Los Angeles, Calif. Prior to the outbreak of war the Pacific Lighting Corporation had a well organized emergency program primarily designed to operate following disaster from flood and earthquake. This program has now been extended to cover defense against sabotage and enemy action. These measures are described and detailed in this paper.

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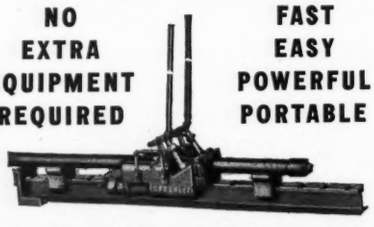

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PEOPLE

D. E. Buchanan, Tulsa, Okla., has been appointed director in charge of the Office of Petroleum Coordinator, District 3, with headquarters at Houston, Tex., succeeding **Grady H. Vaughn**, who is being transferred to Washington. Mr. Buchanan will continue to serve as District 3 Director of Natural Gas and Natural Gasoline, a post he has held since last January.

• •

Jack Torbert, new business manager of the Wyandotte County Gas Co., Kansas City, Kan., has been appointed head of the U. S. Citizen Service Corps of Kansas City with Division of Education, Salvage, the Wyandotte County United War Fund, Inc., Consumer Service, War Bond Sales, Recreation and Health under his jurisdiction.

• •

W. Alton Jones, president, Cities Service Co., Kansas City, Mo., has been selected to head the War Emergency Pipeline, Inc., the government owned project which will bring oil 550 miles from Longview, Texas, to a point in Illinois. **B. E. Hull**, president of the Texas Pipeline Co., has been named vice president and general manager. At Mr. Hull's request, **Major A. N. Horne**, formerly manager of the Empire Pipeline Co., has been relieved of his duties in the War College at Washington to serve as general superintendent of operations.

• •

Floyd K. Lawson, formerly sales director of the range division of Geo. D. Roper Corp., Rockford, Ill., has been elected secretary-treasurer to take the place of **T. J. Reynolds**, deceased. **E. Carl Sorby** has been elected vice-president in immediate charge of gas range sales. Since gas range production was stopped July 31, Sorby's work will be closely associated with war production for the duration.

Starting with the company in 1917 in cost and payroll work, Mr. Lawson has been with Roper over 25 years. Mr. Sorby joined the Roper organization in 1928 and is well-known throughout the entire United States and Canada for the work he has done in promoting gas cookery and the CP gas range through utility and dealer groups.

Ronald Merrick, district superintendent for the Southern Counties Gas Co., in Santa Barbara for the last three years, will leave Saturday for Pomona for a similar position. His place in Santa Barbara will be taken by **W. L. Kindred**, who has been assistant district superintendent of the Santa Monica Bay district.

• •

J. S. SPAULDING

The U. S. Army Air Corps acquired another gas industry executive August 31, when **J. S. Spaulding**, wearing a captain's bars, left Los Angeles, where for the past 11 years he has served Southern California Gas Co. as advertising manager, to report for officers training in Miami, Fla. Mr. Spaulding served as a pilot in the air force with the AEF during World War I. Well known throughout the industry, Mr. Spaulding has served on the American Gas Association's National Advertising Committee, and this year directed the Cooperative advertising program of the P. C. G. A.

• •

In the reorganization of the Consumers Power Co., Jackson, Mich., **H. L. Fruechtenicht, Jr.** has become general gas superintendent and **H. J. Neilson**, superintendent of all company pipe lines. **Clarence M. Peters**, Mr. Fruechtenicht's assistant, has been named gas field superintendent, and **Don G. Daykin**, compression superintendent.

• •

North Bigbee, for the past three years associated with the Texas Mid-Continent Oil & Gas association, and formerly oil editor for The Dallas News, has resigned to accept a commission as a first lieutenant in the Army Air Corps.

• •

H. J. Zopf, South American manager for the export division of Servel, Inc., Evansville, Ind., has joined the State Department. He is considered an authority on South American affairs.

• •

Q. B. Osgood, formerly at Georgetown, Texas, has been appointed sub-district manager for Community Natural Gas Co. at Bartlett, Texas, succeeding **Alfred J. Craft**, who has been transferred to Taylor.

• •

George Belchic, executive vice-president of the company since its organization in 1928, has been elected president of Southwest Natural Gas Co., Shreveport, La. Mr. Belchic started in the oil and gas business on the Gulf Coast. He moved to Shreveport in 1916, where for many years he engaged in the drilling contracting business.

• •

The honor roll of A. G. A. Laboratories in the armed forces has been increased to 21 with **F. E. Hogdon, H. L. McPherson** and **G. A. Duncan** entering various branches of the service.

A reserve officer with the rank of second lieutenant in the coast artillery, Mr. Hogdon was called into active service late in July. He was a member of the laboratories' war products department. Mr. McPherson was commissioned a second lieutenant in the signal corps, and Mr. Duncan resigned to enlist in the Navy.

SEMET-SOLVAY
ENGINEERING CORPORATION

•

Blue Gas Plants — Gas Purifiers
Water Gas Machines — Condensers
Washer Coolers — Waste Heat Boilers
Naphthalene Scrubbers — Producer Gas Plants

40 RECTOR STREET, NEW YORK, N. Y.

Orders of the Day...

★ ★ ★

All Klixon thermally-operated Gas Valves and Room Thermostats must be delivered to the war front—to new war plants, to Army and Navy camps, or to new Government housing projects. These are the orders of the day. So when ordering, make sure you specify your priority ratings and use symbols. Also, order early for quickest possible delivery.

Spencer Thermostat Company
803 Forrest Street

KLIXON
Atteboro, Massachusetts

Bringing the number of former American Gas Association Testing Laboratories engineers now serving in the armed forces to a total of 18, **Carl F. Geltz** and **Norman F. Schulz** were recently inducted. Mr. Geltz was assistant chief inspector at the Cleveland Laboratories. He joined the staff in January, 1939. Graduating from Case School of Applied Science in 1937 with a B. S. degree in mechanical engineering, Mr. Geltz was employed in the engineering departments of the American Steel & Wire Co. and Swift & Co., both in Cleveland, before entering the Laboratories. Mr. Schulz joined the Laboratories in March, 1941, in the research department. He was previously employed as a chemical analyst of Talon, Inc., Meadville, Pa., and received his bachelor of chemical engineering degree at the University of Minnesota.

In the Navy, two former Laboratories engineers were recently promoted to the rank of ensign. **Walter J. Gay,** who enlisted the first of this year, has successfully completed the course given to graduate engineers to qualify for his new rank.

Frank J. Pryatel was commissioned after six months preliminary training in naval ordnance. He was primarily engaged in adjustment and repair of special instruments and apparatus. During the course of this brief assignment he was recipient of the Navy "E" award for meritorious industrial achievement.

• •

Elmer F. Schmidt, vice president, Lone Star Gas Co., Dallas, Texas, has been appointed a member of the Military Affairs Committee, Dallas Chamber of Commerce.

• •

Charles D. Byrd, who has been chief statistician of the Association of Gas Appliance and Equipment Manufacturers since 1936, has joined the Army and is now in training at Camp Chaffee, Ark.

• •

Frank Thompson, engineer with the California State Railroad Commission, San Francisco, has closed his desk for the duration, reporting September 8 to the Naval Training Station, Newport, R. I., with a lieutenant's commission.

• •

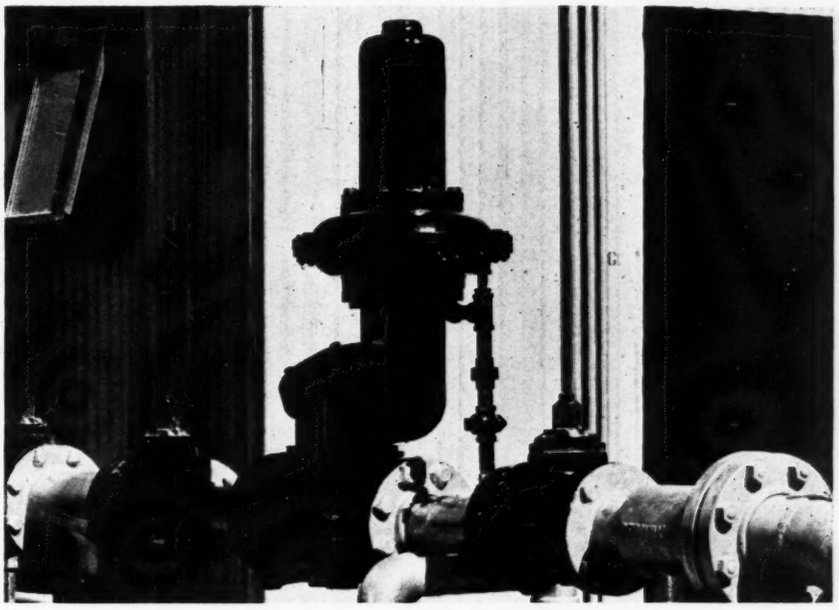
Reaching the 50-year mark in the gas industry last June, **Joe Taylor** now finds himself in the awkward position of being sales manager of the Gainesville Gas Co., Gainesville, Fla., with nothing to sell. Mr. Taylor, however, is not downhearted since he plans to "keep rolling" for some years yet, and while waiting for peace and new merchandise is feeling fine and enjoying the Florida weather. In his many years of service in the gas industry, he has seen both good times and bad, having started with the Sing Sing Gas Co. in 1911 and being, at various times, sales manager of the Baltimore Gas Appliance Mfg. Co., with the Walker Pratt Mfg. Co.—now the Standard Gas Equipment Corp.—and the Edgar Morris Sales Co., and sales manager of the Pittsburgh Water Heater Corp.

• •

Stanford Payne, chief deputy oil and gas supervisor for the Texas Railroad commission, has resigned that post, effective Sept. 1. There will be no immediate appointment of a successor, commission officials indicated.

• •

According to announcement from **L. B. Denning, Jr.,** vice president and operating manager for Community Natural and Texas Cities, **Walter H. Dickson,** formerly located at Urbandale, has been appointed subdistrict Manager for Community Natural at Richardson, succeeding **Ben L. Massey.**



BEFORE..... AND AFTER

Design and construction improvements gave Reliance Regulators the preference of gas companies before the war.
Further improvements and additional facilities for manufacture will maintain this preference after the war.
Reliance Regulators are made in types for every gas requirement. In conjunction with American Meters, they combine every desirable feature for measurement and control in the gas industry—natural, manufactured and liquid petroleum—for commercial, domestic and industrial installations.

REGULATORS YOU CAN RELY ON — RELIANCE — SINCE 1911 — TRADE MARK

Send for Bulletins

AMERICAN METER COMPANY

RELIANCE REGULATOR CORPORATION
1000 MERIDIAN AVENUE, ALHAMBRA, CALIFORNIA

GAS—1709 W. 8th Street, Los Angeles, California

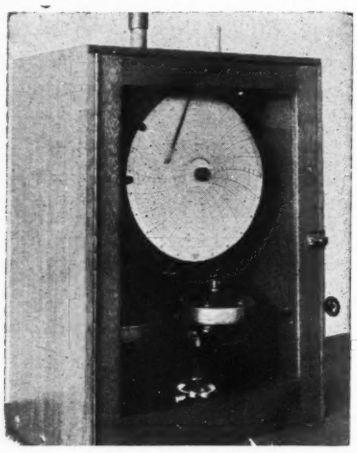
Yes! SEND ME GAS *for* 2 Years at $3.00

SUBSCRIPTION RATES: United States, Mexico, Cuba, South and Central American countries (in advance), two years $3.00; all other countries, $3.00 per year.

Name..... Position.....
Company.....
Address.....
City..... State.....
☐ Check enclosed ☐ Send bill

NOW!

RECORD SPECIFIC GRAVITY of GASES *ACCURATELY* regardless of temperature variations



ARCCO-ANUBIS RECORDING GAS GRAVITOMETER

This dependable, direct-weighing instrument produces highly accurate records of the specific gravity of gases on a circular chart that can be read directly to the second decimal place, and by easy and close approximation, to the third decimal place.

Even under extreme conditions of temperature change, consistent records are always procured, for a temperature-compensating pendulum controls the recording of the specific gravity of the gas always as though the gas were at 60 degrees Fahrenheit.

Careful construction without mechanical complexities, such as electric motors or pressure valves, renders this instrument practically frictionless and hence extremely responsive to even minute variations in the specific gravity of the sample. Its sturdiness assures long, faithful service. Once it is calibrated and properly installed, no further attention is required except to wind the clock, change the chart, and ink the pen.

Send for New Bulletin

AMERICAN

RECORDING CHART CO.

3113 East 11th Street, Los Angeles, Calif.

510 South Lansing Avenue, Tulsa, Okla.

F. L. Carmichall, manager of Fort Worth Division, Lone Star Gas Co., has been named a director of the Fort Worth Community Chest and War Chest for the 1942 drive to get under way in Fort Worth on October 12.

W. Kemp Walker was appointed, effective August 1, gas and electric engineer of the Oklahoma Corporation Commission to succeed **E. M. Myers** who resigned that position to become a senior engineer, Gas Division of the Power Branch of the War Production Board.

Mr. Walker, was employed by the Oklahoma Corporation Commission as a gas valuation engineer from 1931 to 1933.

Jack Baumel of Austin, Texas, was appointed to membership on the research and coordinating committee of the Interstate Oil Compact Commission to replace **Dr. F. V. L. Patten** of Austin. The latter recently resigned as chief supervisor of oil and gas in Texas and chairman of the research and coordinating committee, to become assistant director of the OPC division of reserves.

Mr. Baumel is a 1937 chemical engineering graduate of the University of Texas. He was selected for a place on the research and coordinating committee by three members of the Texas Railroad Commission at the request of Oklahoma Governor **Leon Phillips,** chairman of the Interstate Oil Compact Commission.

Obituaries

William Hull Stangle

William Hull Stangle, 61, new products department manager of Servel Inc., Evansville, Ind., died in Baltimore on Aug. 7. Mr. Stangle had undergone an operation at Johns Hopkins Hospital.

Mr. Stangle had been with Servel for three years, coming to Evansville from Forest Hills, N. Y. Prior to joining Servel, he had been with the Westinghouse Manufacturing Co., Mansfield, Ohio.

At Servel, Mr. Stangle had been working on products to be manufactured after the war, equipment still in the research stage. He was graduated from Pratt Institute and Columbia University where he majored in architecture, mechanical and chemical engineering.

• •

Ulric Croy

Ulric Croy, well-known in the export field as an expert on Far Eastern affairs, died suddenly on August 2nd in his automobile near Peekskill, N. Y., from a heart attack. Mr. Croy was Far Eastern manager for Servel, Inc., of Evansville, Ind. He lived at Tuckahoe, N. Y.

• •

John C. Hays

John Coffee Hays, executive vice-president of the Stone & Webster Engineering Corp., 90 Broad Street, New York City, builders of power plants, oil refineries and other structures in many countries, died July 21st at his home, 875 Park Avenue, after a brief illness. He was sixty years old.

• •

C. H. Suydam

Charles H. Suydam, assistant division manager of the San Francisco, Calif., division of the Pacific Gas & Electric Co., died recently. Mr. Suydam entered the employ of the company in 1910 as a salesman and advanced to assistant division manager.

Fluor Corp. Opens School To Train Piping Draftsmen

To break a bottleneck in refinery and natural gasoline plant engineering and design developing through the scarcity of piping draftsmen, The Fluor Corp., Ltd., Los Angeles, Calif., where the drafting department has undergone a growth from 60 draftsmen, before the war, to a point where the company now employs 225, has recently established a school for training these specialized draftsmen.

Instructor of the class is Walter Lipman, formerly employed as a piping draftsman by Union Oil Co. of California and General Petroleum Corp., and currently employed as a vocational teacher with the Los Angeles County Board of Education. Mr. Lipman is paid by the Montebello School District which is reimbursed for his salary by the Federal Government as part of its defense educational system. The Fluor Corp., Ltd., in turn employs and pays each student a wage during his period of instruction.

Students entering the class must meet certain definite requirements as to general education and experience, the minimum being graduation from high school and at least two years' experience in mechanical drafting or a university education with at least two years' experience in engineering.

• •

New Jersey Standard Oil To Sell Gas Holdings

September 22 has been set by the SEC as the hearing date for proposals of the Consolidated Natural Gas Co. to acquire properties of four natural gas subsidiaries of Standard Oil Co. of New Jersey. Gas subsidiaries of Standard of New Jersey involved are the Hope Natural Gas Co., East Ohio Gas Co., Peoples Natural Gas Co. and the River Gas Co.

Consolidated Natural Gas Co. would issue stock amounting to $81,850,770 in exchange for the gas properties. Ultimately the Consolidated stock would be issued to the shareholders of Standard. The Consolidated company proposes to acquire $83,969,300 of outstanding capital stock of the four natural-gas subsidiaries in exchange for its own common stock.

The proposed plan is the outcome of an order entered by the SEC on February 5, 1942, denying the application of Standard for exemption from the Holding Company Act of 1935. Standard elected to divest itself of its natural-gas properties.

• •

Petroleum Industry Collects 454,155 Tons of Scrap Rubber

"The petroleum industry deserves enthusiastic congratulations and commendations for its splendid work as total collections of scrap rubber during the June-July drive by the petroleum industry were 454,155 tons (908,310,000 lbs.). This amounted to 6.87 lbs. for each man, woman and child in the United States. It will furnish work for the present rubber reclaiming plants for a year.

Only the scrap rubber actually moved to the petroleum bulk plants and weighed was included in the 454,155 tons reported.

• •

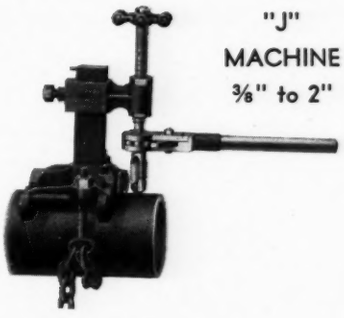
Dehydration Plant Uses Gas

Dehydrating cereal grasses such as oats, barley, rye and sudan grass is a recent development at the Evergreen farms near Weslaco, Tex., where approximately 300,000 cu. ft. of natural gas from a nearby well is consumed daily in the process. The products of dehydration are used chiefly for medical purposes.

Get your tapping machine —NOW!

If you need a tapping machine may we suggest that you send us your order today. Our present supply may not last long. . . We are filling war contracts, and that means we have less time and material to give to our regular products. Therefore, we cannot make promises as to future deliveries. —The "G" machine shown will drill and tap any pipe—dry or under pressure. The body and base is rigidly constructed of malleable iron. Ample tool support is provided, assuring long service. The "J" model is for dry pipe only, but can also be used for tapping columns, boilers, structural iron, etc. It has a short, heavy standard and uses short shank tools of high grade steel. They cut clean holes and sharp threads. Easily adapted to close quarters. . . Hundreds of these machines now in use attest to their practical design. Order yours today while we have them. Address Dept. G-141.

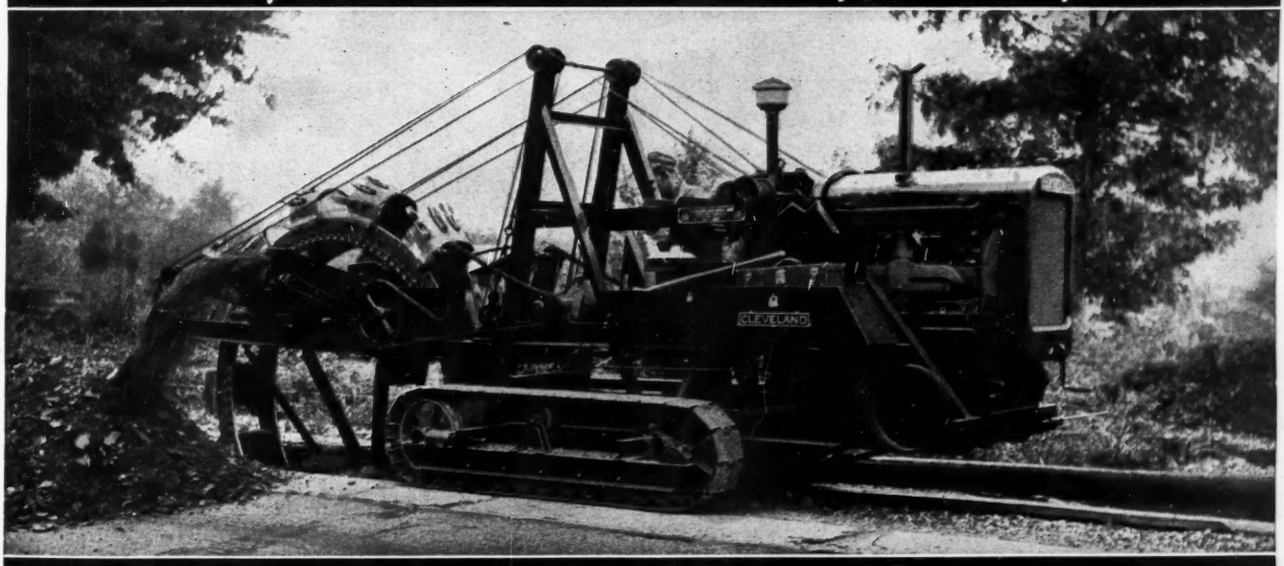
"G" MACHINE 3/8" to 2"



"J" MACHINE 3/8" to 2"

Los Angeles, Calif. **MUELLER CO.** Decatur, Ill.

In This—the Great Emergency—**CLEVELANDS** As Always—Are Coming Through



When there's ditch to dig—or fill—you'll always be glad you bought a "CLEVELAND." Keep them in fighting trim by regular attention to maintenance and lubrication.

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. *"Pioneer of the Small Trencher"* CLEVELAND, OHIO

"CLEVELANDS" Save More . . . Because they Do More

For
QUICK REPAIRS
in Defense
Emergencies!

For war-time emergency-breaks in pipe lines, this Doublex Simplex Split Sleeve will enable you to make quick, economical, effective repairs. You should have a supply of several of each different size that you might need. Thousands in use, some for 13 years. Order now from shipping point nearest you as follows: Birmingham, Dallas, Kansas City, Los Angeles, Minneapolis, San Francisco, Pittsburgh.

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CAST IRON PIPE CO.
BIRMINGHAM, ALA.
Dallas Houston El Paso Pittsburgh
Kansas City Chicago Minneapolis
New York City Cleveland
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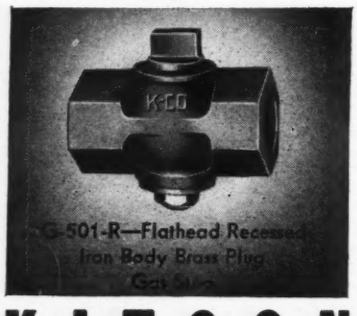
"K-CO
TRADE MARK
guarantees good
Gas Stops"

★ Truly precision-built products: made of finest grade materials: accurately machined: carefully tested.



KITSON
COMPANY
1500 Walnut Street • Philadelphia, Pa.
Subsidiary of Welsbach Engineering and Management Corporation

PRODUCTS

High Pressure Flow Meter

Cochrane Corp., Philadelphia, Pa.

Model: Ultra High Pressure Flow Meter.

Application: For the measurement of nitrogen, hydrogen, ammonia, and other gases at pressures above 5000 lb. per sq. in.

Description: The mercury sealed manometer is a stainless steel ring 15 in. in diameter. The ring is balanced on knife edges at its geometric center. The partition at the top of the ring is formed of a solid stainless steel block suitably drilled for the pressure connections. Nickel tubing connects the top of the ring to the center of rotation where they join the free (inboard) ends of the twin 6-in. nickel torsion tubes. The outboard ends of the torsion tubes are anchored and to these the pressure lines from the primary elements are connected. By this design the ring tilts 10° for the full differential range measurement which may be between 4 and 9 in. of mercury, depending on the cam weight supplied. The cam extracts the square root relationship so as to express the flow directly in uniform increments on the 36-in. indicating scale, which may also be combined with an integrator and/or 12-in. recording chart feature. The exceptionally rugged construction combines every desirable detail such as ball bearing cam strap sheave, integral plumb bob and alignment scale, lens type metal gaskets, mid-scale calibrating pin so as to afford maximum dependability and operating convenience.

■ ■

Silent Check Valve

The Williams Gauge Co., Pittsburgh, Pa.

Model: Williams-Hager Flanged Silent Check Valves.

Application: In all pump lines handling gas, water, oil, acids, alkalies, and other fluids.

Description: Made of bronze, cast iron, steel, stainless and monel metal for pressures varying from 150 to 2500 lb. in sizes from 1 in. to 20 in., inclusive. The valves have only two parts subject to wear, the valve disc and seat, and both of these are easily removable and renewable. The valve can be reseated without special tools.

■ ■

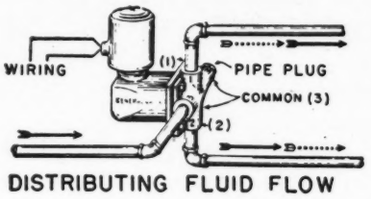
Valve

General Controls Co., Glendale, Calif.

Model: Series W-3-3, -4, -5, Three Way Magnetic Valve.

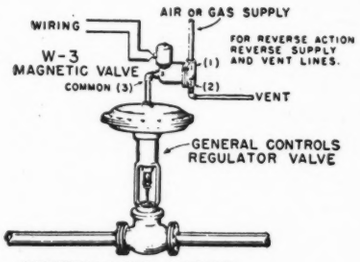
Application: Used for control of fluids to piston and diaphragm operators on valves, doors and gates, as well as for applications where fluids must be distributed from a common source, for pneumatic pumping or for selection of fluid sources. Handles oil, water, air, gas, steam, refrigerants and similar fluids and vapors not corrosive to valve material up to 400° F. with I. P. S. sizes up to 1-in. and port sizes to 15/32-in.

Description: Being of the single magnetic type, the valve cannot assume an intermediate position, i. e., when port No. 1 is open to the flow, port No. 2 is closed when current is on; when current is off, port No. 2 is open to the flow and port No. 1 is closed. Valve construction is such that if reverse action is desired it is only necessary to change No. 1 and No. 2 connections. New design also permits high pressure connection to either common, No. 1 or No. 2 ports without affecting valve operations as long as pressures (differential) are held within certain ratings. Available for all commercial voltages—A. C. or D. C.



DISTRIBUTING FLUID FLOW

APPLICATIONS:



CONTROLLING LARGE DIAPHRAGM REGULATING VALVE

Catalogs

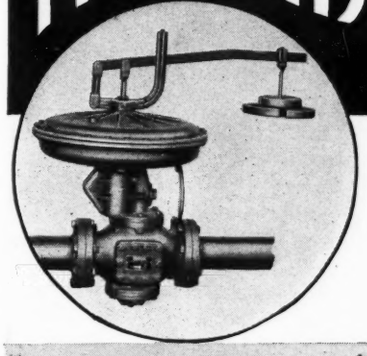
• Handy and Harman, Precious Metals, 82 Fulton St., New York, N. Y., has published an 8½ by 11 in., 8-page folder on the method to be used in silver alloy brazing of fabricated copper piping. The material prepared gives completed and specific instructions for preparing the pipe, for setting up the work and for doing the brazing.

• H. S. Cover, Station A, South Bend, Ind., has issued descriptive literature and a price list on the new 1942 Dupor goggles and respirators. The gas-tight, fog-proof rubber goggles offer protection from gas or chemical fumes. The patented double filter respirators are pictured and described in detail.

• Caterpillar Tractor Co., Peoria, Ill., has issued an eight-page booklet titled "Caterpillar Power for Pipe Line Pumping," which contains action pictures of various Caterpillar diesel engine installations and specifications of 11 models of the company's product.

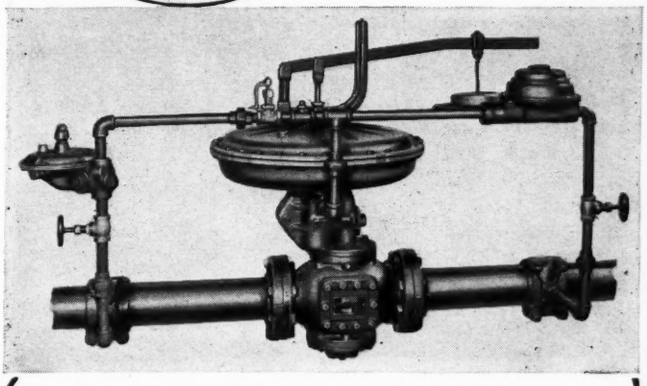
• American Machine & Metals, Inc., DeBothezat Ventilating Equipment Division, East Moline, Ill., has issued a 16-page booklet titled "'41 in Review."

IT'S VERSATILE!



This illustration shows the Regulator as a straight diaphragm operated Regulator.

Below is illustrated the Regulator with Reynolds High and Low Pressure Auxiliary Regulator with needle point valve.



● REYNOLDS New Versatile Regulator can be supplied as a straight diaphragm operated Regulator or with auxiliary regulators for either pounds to pounds or pounds to inches regulation. With the auxiliary Regulators so installed, the Reynolds principle of controlling the main regulator by high and low pressure auxiliary regulator is still maintained. This principle gives the closest and most accurate regulation obtainable.

Adaptability plus versatility feature this new Regulator which is a balanced valve, flanged type with internal toggle levers which give a 12 to 1 lever ratio for operation of the valve. It can be used for pounds to pounds reduction, or pounds to inches or ounces, depending upon the size of the diaphragm case used. Should a customer have either type and want to change to the other, all that would be necessary would be to change the diaphragm cases.

Reynolds Versatile Regulator is manufactured in a range of sizes from 2" through 12". It will reduce pressures to inches W. C., or pounds to pounds. This Regulator can be used where space is limited, making it impossible to use the auxiliary bowl. Let REYNOLDS adapt their new versatile Regulator to your Gas Control System.

Representatives

Eastern Appliance Co.
Boston, Massachusetts

Wm. A. Ehlers
No. 268 Park Street
Upper Montclair, N. J.

Branch Offices

423 Dwight Building
Kansas City, Missouri

2nd Unit:
Santa Fe Building
Dallas, Texas

GAS CONTROL SINCE 1892

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

Johns-Manville
TRANSITE FLUE PIPE

AN ASBESTOS PRODUCT

For venting gas-burning appliances

No Siren Blows
a warning of industrial
Gas Attacks

It may take considerable time for light concentrations of gas, vapors, mists or dusts to do its damage, but it's just as serious in its results as chemical warfare. Provide your workers with respiratory protection. If in doubt about your conditions, consult your safety supply house.

18-9

Please send me the new folder "Let's Equip Industrial Workers To Meet The Daily Gas Attacks." It contains suggestions for low-cost protection for all occupations.

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Everything BULLARD in Safety

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RATING 1/4 H. P.

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850 BASO SWITCH
Provides
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GREAT FLEXIBILITY

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MILWAUKEE WISCONSIN

Butane Handbook 3rd Edition Published

TO keep pace with the rapid development of the liquefied petroleum gas industry, the Third Edition of the *Handbook Butane-Propane Gases* was released August 1, 1942, by Western Business Papers, Inc., 1709 West 8th St., Los Angeles, Calif. (Price $5 per copy.) This new edition has been completely rewritten, revised and expanded. New chapters have been added, illustrative material has been brought up to date, and tabulated matter has been revised in the light of the most recent experience and generally accepted practice.

New chapters which have been added to the Third Edition, supplementing information published in previous editions of the Handbook, include two introductory chapters—one on the History of the Industry and a second, "The ABC of LP-Gas," which outlines briefly and in simple terms the basic principles of liquefied petroleum gas operation. Other subjects which have been expanded into new chapters include safety practices, liquid metering and pumping, installation and servicing of LP-Gas systems, domestic utilization and commercial utilization.

The Third Edition of the Handbook is divided into eight major parts which are in turn subdivided into chapters. Part 1 contains the two new introductory chapters. Part 2 is devoted to discussions of the physical and chemical properties of the hydrocarbons; Part 3, the production of liquefied petroleum gases from natural gasoline plants, recycling plants and oil refineries; Part 4, transportation by truck, rail, water and pipe line; Part 5, distribution through semi-bulk, bottled gas and central plant facilities; Part 6, utilization in domestic, commercial and industrial applications and as a fuel for internal combustion engines. This part also includes chapters on the comparative performance of liquefied petroleum gas with other fuels and on the uses of liquefied petroleum gases for standby purposes.

In Part 7, the various Regulations which govern the liquefied petroleum gas industry are outlined. These include N. B. F. U. Pamphlet No. 58, Motor Carrier Tariff No. 7, Freight Tariff No. 4, Unloading from Railroad Tank Cars and Marine Regulations. Part 8, the appendix, carries a discussion of products liability insurance, handy tables for field use, and a bibliography of important published data on the various phases of LP-Gas operation.

■ ■

New Welding Company

Pressure Weld Co., a Delaware corporation and subsidiary of El Paso Natural Gas Co., was granted a state charter in Austin last month. Officers of the new company are the same as those of the gas company: Paul Kayser, president; C. C. Cragin, vice-president and general manager; A. L. Forbes, Jr., vice-president and general superintendent, and J. E. Franey, secretary-treasurer. The company will use a new welding process for construction of pipe lines for the gas company and may do some contracting for other organizations.

■ ■

L. P. G. A. Re-elects Officers

At the first meeting of the new executive board of the Liquefied Petroleum Gas Association, officers who served last year were re-elected, except that Ernest Fannin succeeded C. L. Parkhill as vice president. Mr. Parkhill declined to serve again.

The officers for the ensuing year are Geo. W. Bach, president; Ernest Fannin and Ellsworth L. Mills, vice presidents; F. R. Fetherston, secretary.

Out of print publications of the
U. S. GEOLOGICAL SURVEY
and
U. S. BUREAU OF MINES
are now for sale. Write for lists, specifying states in which you are interested.
JAMES C. HOWGATE, Bookseller
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FOR SALE

Roots-Connersville Gas Pump. No. 9—Style D—Heavy-Duty High Pressure. Six bearing type mounted on short bed plate with shaft extension for direct-drive coupling. Displacement 11 cubic feet per revolution. Speed 250 revolutions per minute. This pump has been in operation less than one year and has been in storage for a number of years. Price $600 f.o.b. Toledo. Pump can be inspected at

SURFACE COMBUSTION CO.
Toledo, Ohio

GEORGE A. BURRELL
Gas Engineer
Design—Construction—Reports
Court Work

■

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